

i = Galois

A Fictional Biography of the French Mathematician
Evariste Galois (1811- 1832)

together with
a methodological introduction and select bibliography.

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Submitted in fulfilment of the requirements for the degree of Master of Arts in
the Department of Humanities, Faculty of Arts, Victoria University of
Technology.

October 1995



FTS THESIS
A823.3 PET
30001004466571
Petsinis, Thomas
i = Galois : a fictional
biography of the French
mathematician Evariste

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Abstract

The project seeks to fuse mathematics and literature by presenting a fictional biography based on the French mathematical prodigy Evariste Galois (1811 - 1832).

After thoroughly researching and reading all the English sources, together with translations of material in French, it was found that most biographers presented a sketchy, two-dimensional picture of Galois. These biographies contained gaps at important stages in Galois' life and failed to be consistent with the known facts in dealing with the causes that lead to his death. Furthermore, subsequent findings have invalidated some of these earlier biographies. Given these shortcomings, it was felt that a fictional biography, rather than a conventional biography, would be a more appropriate form for investigating the subject. This form, essentially a novel, provides an alternative means of depicting the subject's character, personality, motivation and mathematical thinking. It also allows for speculation, often beyond the scope of more conventional biography, which may provide valuable insights and new perspectives on historical figures.

In the final analysis, this fictional biography will provide one possible solution (as with mathematics there may be other solutions) to the problem of textualising a three-dimensional character-study of the life, work and death of Galois.

(Except where otherwise indicated, the material in this document is the original work of the candidate and has not been previously published. An extract from the novel will appear in the November 1995 issue of the Australian Book Review.)

Acknowledgements

I am most grateful to Associate Professors Ian Murray and Neil Barnett, past and present Heads of the Department of Computing and Mathematical Sciences, for making available the facilities and resources of the Department, and for the generous scholarship which enabled me to reasearch and complete the project.

I would also like to thank the following people for their direct contributions to the project:

1. Principal supervisor Associate Professor David English, Head of the Humanities Department, for accepting to supervise such a challenging project; for his forthright critical comments and suggestions, which served to trim and shape the first shaggy draft into its present form; and for his advice and assistance in editing the final draft.
2. Assistant supervisor Doctor Michael Baker, Department of Computing and Mathematical Sciences, for being a patient sounding-board in the early stages, when the project had yet to find its direction; for assisting with some translation; and for sharing his knowledge of the history and philosophy of mathematics.
3. Professor John McLaren, Humanities Department, whose initial enthusiasm for the project encouraged me to take the first step.
4. My wife and daughters, for sharing me with the refractory, obstinate, demanding Evariste Galois.

Introduction

1. Background to the Project

Evariste Galois (1811-1832), was a French mathematical prodigy who lived in an age of Revolution and Romanticism. His tempestuous life highlights the interplay between history and the individual, creativity and tradition, order and chaos, genius and self-destructiveness. Dramatisations (novels, plays, films) have been done based on artists, musicians, poets from the Romantic period, but very little on the mathematicians and scientists of this period. The facts of Galois' life cry out for dramatic adaptation. (As a fictional biography, this novel is an attempt to represent one likely portrait of Galois) Quantum physics proposes the possibility of multiple universes existing in parallel, with the 'real' or 'visible' universe determined by the presence of an observer. This is a good analogy for the work under consideration. It may be argued that multiple personalities of historical figures exist within historical texts. Whenever someone writes about Galois the person, as opposed to his mathematical work, they 'realise' one possible Galois from the infinite possibilities.

Galois proposed an original theory concerning the conditions necessary for higher order equations to be solvable by radicals - algebraic processes involving the four arithmetical operations and the extraction of roots. By taking certain characteristics of an equation and applying to them his findings concerning the behaviour of groups, he was able to determine the solvability of equations. He was not concerned with finding particular solutions of equations, but with the more general problem of determining a priori whether or not solutions existed. His intuitive approach and his idiosyncratic manner of exposition can be compared with the impulses and forms which characterise Romantic art, music and poetry. It might be argued that artists and scientists such as Galois, who sought freer modes of expression, contributed to the spirit of the revolutionary times as much as their political contemporaries.

Overlooked in his lifetime, Galois' findings were brought to the attention of the mathematician Liouville, who edited his papers in 1843, and thereby announced a new, fertile area of mathematics. The importance of Galois' findings can be gleaned from the tribute paid to him by the mathematician Camille Jordan, who, forty years after Galois' death, wrote a very influential six hundred page book on the theory of equations which he regarded as nothing more than a footnote to Galois' work.¹

In this century Galois' seminal discoveries have continued to inspire researchers; a branch of mathematics, Galois Theory, has been named in his honour. His new approach to algebra, via the idea of groups, has resulted in the importance of structure in contemporary mathematics. It is interesting to note that Galois' purely abstract theory, with no physical applications during his time, is now used in many practical situations, for example, crystallography, which was used to decipher the D.N.A. code, which has in turn led to genetic science and genetic engineering. In recent years, the English mathematician Andrew Wiles has proposed a solution to Fermat's famous Last Theorem, which has baffled scholars for more than 350 years. Wiles' 200 page proof uses, amongst other things, Galois Representations.²

The documented life of Galois contains contradiction, speculation and lacunae due simply to a lack of biographical information. Unlike the lives of mathematicians recognised

in their lifetime, who were written about by contemporaries, who left diaries and other personal records, Galois wrote little about himself, apart from a few letters. As his work was not appreciated by his contemporaries, we have little in the way of incidental and anecdotal material. Despite the paucity of details, there appears to be no doubt among his biographers that his short life was full of inner tension, instability, and an increasing propensity toward self-destructive behaviour.

How did these anarchic, chaotic tendencies coexist with his mathematical preoccupations? Galois' life and personality present a problem, an equation of sorts. Given the dichotomies, and the unknowns, (a creative reconstruction of his life can be seen as an attempt to solve an equation with many variables. How does one go about solving such an equation? And will the solution be correct? Unlike mathematical equations, where the solution can be tested by substituting into the equation, the solution to this literary problem cannot be verified directly: other criteria, such as aesthetic and artistic, may be used to establish validity. This is where mathematics and literature have been thought to differ: the subjectivity of the reader, critic, examiner cannot be excluded from the text. In this sense, the reader brings his/her experience into the reading and this in turn affects the text - a case of the experimenter's very presence influencing the outcome of the experiment.

The aim of this novel is to offer 'a possible solution' to the problem of reconstructing Galois. Which literary genre would best express my solution? The form of the work and the solution itself are inextricably bound; that is, the solution lies as much in the form as in the facts. Should the solution be sought in the form of a traditional biography based squarely on the documented details? Should the work be leavened with a little imagination? That is, a biography that would accept the facts, but which would use them with some liberty. A work that would portray Galois not in the Classical mould, but in the spirit of Romanticism. A portrait by Delacroix, not Holbein. Or should one consider a third possibility? An imitation of a biography? Or, to develop the painting analogy, an expressionistic portrait - something in the manner of Albert Tucker. What is meant by 'imitation' is the sort of work the American poet Robert Lowell attempted in his loose translations of European poetry. He used the original material in a free manner, creating poems in English that stood as valid works in their own right. Why shouldn't original poetry spring from poetry, just as it springs from the 'real world'? If we take the undisputed facts of Galois' life as the source material, and this is in French, then a fictional biography would be a kind of imitation or adaptation in very much the manner of Lowell.

Are there other possibilities? (perhaps there is more in quantum mechanics than is dreamt of between heaven and earth). One could attempt to depict a non-representational portrait, an abstract work, where time is broken into instants, and the personality into fragments, and the sum-total of these fragments and instants amounted to the life of Galois.

Which of these literary genres would best realise the solution to the problem of representing Galois' life? A straight biography was never my intention for several reasons. Firstly, I am not an historian. Such a biography was done very well by Paul Dupuy in his 1896 work *La Vie d'Evariste Galois*, which presents the facts in a scholarly manner. He researched his subject and analysed his material with a critical eye. He read Galois' mathematical work, spoke to relatives, and consulted a variety of sources, including letters, newspapers, even school reports.³ Secondly, as a writer of fiction and a teacher of mathematics, my intention from the very outset was to combine these areas in the form of a novel.

2. *Methodological Issues*

2.1 *Fictionalising Biography*

What is biographical writing? How does it differ from fictional biography? Both have an historical figure as their subject, both require extensive research, both are anchored in texts. As Linda Hutcheon writes: "We cannot know the past except through its texts: its documents, its evidence, even its eye-witness accounts are texts."⁴ If both forms spring from a common source, historical texts, their differences are apparent in how each uses the source material. Fictionalisation (by this I mean elaboration, interpolation, poeticisation, speculation, dramatisation) occurs in both; however, it is the degree of fictionalisation that differentiates one form from the other. And this degree is determined by the author's temperament, purpose and attitude toward the subject.

A passage from Plutarch, one of the greatest of biographers, will highlight the fictionalisation that occurs even in model biographies. In his *Life of Marcellus*, Plutarch relates the death of Archimedes in the following terms: "But nothing afflicted Marcellus so much as the death of Archimedes, who was then, as fate would have it, intent upon working out some problem by diagram, and having fixed his mind alike and his eyes upon the subject of his speculation, he never noticed that the city was taken. In this transport of study and contemplation, a soldier, unexpectedly coming up to him, commanded him to follow to Marcellus; which he declining to do before he had worked out his problem to a demonstration, the soldier, enraged, drew his sword and ran him through."⁵ This passage has several elements that mark it as classic biography: the tone is objective, the author is reporting an incident he has heard or read about - reporting it in an omniscient manner. And yet, Plutarch has taken liberties with his material. As he was not an eye-witness to the incident, he has interpolated, speculated, perhaps dramatised the death of Archimedes.

In his introduction to *Plutarch's Lives* A. H. Clough writes: "Plutarch was a moralist rather than an historian. His interest is less for politics and the changes of empires, and much more for personal character and individual actions and motives to action."⁶ He goes on to say: "Much has been said of Plutarch's inaccuracy; and it cannot be denied that he is careless about numbers, and occasionally contradicts his own statements. A greater fault, perhaps, is his passion for anecdote; he cannot forbear repeating stories, the improbability of which he is the first to recognise."⁷

From this we see that Plutarch's predisposition to anecdote introduces a fictional element to his biographies. His account of the death of Archimedes is often considered to have been based more on popular imagination than fact.

A more recent example of biography with a strong fictional tone is Henri Troyat's *Divided Soul: The Life of Gogol*. This is an authoritative, scholarly work; it involved a great deal of research and contains a comprehensive bibliography. Despite this, there are many passages throughout the book which read like fiction. "Gogol was lying in his dressing gown on his sofa, his boots on his feet, his nose to the wall and his eyes closed. A rosary hung from his fingers. He was facing a lighted icon of the Holy Virgin. When Dr. Tarasenkov took the patient's pulse, Gogol grumbled, "Don't touch me, please!" His pulse was weak and rapid, his hands cold, his breathing regular. Dr. Tarasenkov was soon joined by two colleagues, Drs. Alfonsky and Over. The newcomers agreed to try mesmerism to overcome the patient's aversion to food. That evening, a noted hypnotist, Dr. Sokologorsky, stood, resplendent with confidence and concentration, at the dying man's side. He placed one hand on his forehead,

another in the hollow of his stomach; he frowned; but the fluid was not coming through. Irritated by the physician's esoteric gesture, Gogol twisted and turned, moaning, "Leave me alone!" Dr. Sokologorsky abandoned the case in a huff; he was replaced by a colleague famous for his tenacity - Dr. Klimentov - who favored a more aggressive approach and began shouting at Gogol as though talking to a deaf man:

"Does your head hurt?"

"No."

"Your stomach?"

"No."

The interrogation had no effect. However, the doctors did manage to force a cup of bouillon down the sick man's throat, and, despite his howls, administered a soap suppository."⁸

On the basis of tone, descriptive language, and the author's eye for detail, this passage, and there are many such passages throughout the text, could pass for good fiction; in fact, it reads like a passage that Gogol himself might have written. Was this the author's intention? A parody of his subject? It is more than likely Troyat's style was influenced by the fact that he is also a writer of fiction, and that he brought a novelist's sensibility into his biography.

From these two examples of biographical writing, we see the pervasiveness of the tendency to fictionalise, even though fiction was not the intention in either case. Why this tendency? Perhaps the narrative of biographical writing needs drama, texture, 'the feel of life' in order to engage the reader emotionally and intellectually. [It may be argued that biographical writing is in fact a sub-genre of fiction, and that a true biography can only be written within the scope of the novel. Again Linda Hutcheon, writing from a postmodern perspective, has some illuminating points to make on the question of fiction and biography. "By this [Historiographic metafiction] I mean those well-known and popular novels which are both intensely self-reflexive and yet lay claim to historical events and personages... This kind of fiction has often been noticed, but its paradigmatic quality has been passed by: it is commonly labelled in terms of something else - for example, as midfiction... Such labelling is another mark of the inherent contradiction of historiographic metafiction, for it always works within conventions in order to subvert them. It is not pure metafiction, nor is it the same as the historical novel or the non-fictional novel."⁹

In recent times there has been a proliferation of the type of novel to which Hutcheon alludes. One of the pervasive features of postmodernism has been its capacity to challenge, redefine, sometimes eliminate the boundaries between the various art forms, between science and the humanities, between science and religion, between fiction and biography. Is this type of fiction to be read in the same way as one would read a purely imaginative work, say *Crime and Punishment* (though there is perhaps no such thing as a purely imaginative work - all fiction has its basis in language and the world)? Clearly, no. One comes to fictional biography with the expectation of seeing historical figures in a 'different light'. One expects more than aesthetic pleasure, though this must not be underestimated; often, the success of the work will depend more on aesthetics than on new theories about the subject. What new insights can this type of fiction offer? Again Hutcheon provides an answer to this question by quoting Lionel Gossman: "Modern history and modern literature have both rejected the ideal of representation that dominated them for so long. Both now conceive of their work as exploration, testing, creation of new meanings, rather than as disclosure or revelation of meaning already in some sense 'there', but not immediately perceptible."¹⁰ The novelist, therefore, who chooses to write fictional biography redefines his/her subject; often depicting character in ways that provide insights not seen by the biographer.

The General in His Labyrinth, by Gabriel Garcia Marquez, is an excellent example of fictional biography. In it the author deals with the last few months in the life of Simon Bolivar, the Liberator of much of South America. In particular his final voyage along the Magdalena river. As he writes in his afterword, Marquez researched his material thoroughly, corresponding with biographers, scholars and academics, and from a plethora of information he wrote his novel. He acknowledges the book *Bolivar Day by Day*, which "was a navigational chart while I was writing, which allowed me to move with ease through all the periods in the character's life."¹¹ Given the extensive scholarship undertaken by Marquez, how does his book differ from a traditional biography? Like traditional biography it contains dates, factual places and characters, historical battles. The writer even researched the size of Bolivar's shoes.

Yet this is clearly not a biography. One is struck by the narrative tone, by poetic details, by the presence of a novelist pervading every page. For instance, one would not encounter the following passage in a conventional biography. "According to what he [Bolivar] had often told his nephew, he wanted to begin [his memoirs] with his oldest memory, a dream he had on the Hacienda San Mateo, in Venezuela, not long after his third birthday. He dreamed that a black mule with gold teeth had come inside and gone through the house from the principal reception room to the pantries, eating without haste everything in its path while the family and the slaves were taking their siesta, until at last it had eaten the curtains, the rugs, the lamps..."¹² Did the historical Bolivar have such a dream? Is it recorded in his correspondences? Marquez does not say what is fact and what fiction; although the poetic tone of the passage would qualify it as fiction. If this is the writer's imagination at work, does it diminish the life of Bolivar? On the contrary, it adds a dimension, a depth to the historical character, a resonance that is often lacking in conventional biography.

In relation to historical accuracy, Marquez writes: "I was not particularly troubled by the question of historical accuracy, since the last voyage along the river is the least documented period in Bolivar's life. During this time he wrote only three or four letters - a man who must have dictated over ten thousand - and none of his companions left a written memoir of those fourteen calamitous days."¹³ It is precisely the paucity of factual information that gives Marquez scope to offer his version of what Bolivar must have felt and experienced in his last months. Was Marquez' Bolivar the correct solution to his particular problem? Literary critics were very generous in praising the work. As Marquez set out to present his solution in the form of a novel, his solution must be considered a success.

Other fictional biographies which bear similarities to Marquez in differing degrees are: John Banville's *Kepler*, based on the astronomer; Brian Matthews' *Louisa*, based on the life of Henry Lawson's mother; Robert Drewe's *Our Sunshine*, based on Ned Kelly. All are marked by extensive research; all are well anchored in their facts; but they differ from each other in terms of their tone and the amount of fictionalising. These three authors will now be examined.

In his author's note, Drewe says: "Although it concerns people who did exist and touches on actual events, it is a chronicle of the imagination. It owes more to folklore and the emotional impact of some photography and painting than to the bristling contradictions of historians and biographers."¹⁴ Drewe's novel is written in an episodic, disjointed fashion. His narrative voice moves from a third person to the first person voice of Ned Kelly. The novel is further from biography than Marquez' book: through changing narrative, poetic language, shifting time frames Drewe is also challenging the conventional, third-person narrative novel. What has Drewe done to the historical Ned Kelly? Has he given the reader new insights into his subject? Or is the novel merely an exercise in literary virtuosity? Drewe has portrayed a

Ned Kelly that seems relevant to our times, a Ned Kelly who speaks in the language and idiom of our time. Perhaps novelists turn to historical figures because of a fascination with myth, legend and heroes. What arises from this union of novelist and historical subject is a modernisation of the myth, an elaboration of the legend, a reinterpretation of the hero. The biographer represents the hero as a bronze Victorian statue, while the novelist gives us a moving picture.

Matthews has considered the question of fictionalising biography in some depth, and addressed it as part of the narrative in his book. He undertook more research than Drewe, and used extensive sources to 'create' his character, including archives, conversations with relatives, letters and manuscripts written by Louisa Lawson. In the first chapter he writes: "It would be difficult, for example, to wring from relatively sparse evidence the sense of a full life being lived; research material that was unreliable or fragmentary would create a subtle pressure to fall back on chronicling the times (which are, in general, known and safe) in order to disguise the fact that the individual - the biographical subject - too rarely emerges from the shadows." And developing this point, he continues: "In the lack of material...the narrating biographer is under constant pressure to fill or tidy the gaps by subtly inventing...and sliding from biography to phantom autobiography and from both to a disguised form of fiction." "The act of writing biography is stalked at every point by the temptation to invent." "Story is what comes naturally, and story is the enemy of the record, the bane of documentation, the subverter of historical truth in favour of the truth of fiction." Matthews, as an academic and writer of fiction, was faced with a dilemma: "Write a monograph based on the available evidence or invent a form by means of which, without compromising accepted standards of scholarship, I could make creative use of material, ideas and possibilities that lay beyond the reach and guarantee of scholarly research...What I needed was room to move."¹⁵ What he needed was an alternative text and for this he introduced a second narrative voice - Owen Stevens; his alter ego, who provides a commentary on the text in such a way "that it will parallel and take its life and direction from the main story."¹⁶ The voice of Owen Stevens engages in ruminations, speculations, playfulness - those things proscribed by academic scholarship. From the interaction of Matthews and Stevens a portrait of Louisa emerges that is neither standard biography, nor fictional biography such as the previous works discussed, but a constant shifting from one to the other. The reader is in no doubt as to the facts (there are even maps to authenticate the text), but, at the same time, there is a feeling that these facts are somehow being played with, if not subverted.

Playfulness seems to be a characteristic common to these texts. This also occurs in Banville's book, which was especially useful in that, like Galois, it deals with a scientific character, and attempts to convey scientific thought in a way that is accessible to the general reader. Banville's work is a third-person narrative, concentrating on crucial periods of Kepler's life. Unlike Matthews, who had to justify his academic position, Banville writes as a novelist, and so his research consisted of a few books dealing directly with his subject, which he cites at the end of his book. Banville's narrative, style and use of the novel's conventions has resulted in a book not altogether different in form from Marquez's. His Kepler is fictional, and the reader is always aware of reading a novel, but within the fiction there is playfulness and speculation that provide insights into how Kepler might have thought and felt. For example: "Perhaps he was wrong, perhaps the world was not an ordered construct governed by immutable laws. Perhaps God, after all, like the creatures of his making, prefers the temporal to the eternal, the makeshift to the perfected, the toy bugles and bravos of misrule to the music of the spheres. But no, no, despite these doubts, no: his God was above all a god of order. His God works by geometry, for geometry is the earthly paradigm of divine

thought."¹⁷ This is quite clearly the writing of a novelist, but it is conceivable, in fact very probable, that Kepler himself may have had such thoughts.

Banville provides a very illuminating example of what Matthews has termed "ideas and possibilities that lay beyond the reach and guarantee of scholarly research". How would a biographer convey that mysterious moment when intuition becomes a new scientific idea? In most cases such subjective moments are passed over by biographers, whose main concern is objective fact. This is precisely where the novelist may provide insights. Banville describes Kepler's moment of revelation as follows: "On that ordinary morning in July came the answering angel. He was in class, the day was warm and bright...He was demonstrating a theorem out of Euclid - afterwards, try as he might, he could not remember which...He took up the big wooden compass, and immediately, as it always contrived to do, the monstrous thing bit him...He stepped back, into the box of dusty sunlight, and blinked, and suddenly something, his heart perhaps, dropped and bounced, like an athlete performing a miraculous feat upon a trampoline, and he thought, with rapturous inconsequence: I shall live forever."¹⁸ Even allowing for the strikingly modern (if not anachronistic) simile of the trampoline, we see in this passage how Banville, the novelist, ventures into an area that is taboo to the traditional biographer.

2.2 *Researching The Subject*

Having read and thought for some time about the various kinds of fictional biography, I turned my attention fully to what had been written on Galois. The material researched and consulted was all in English, apart from Dupuy's seminal work and a paper by Infantozzi,¹⁹ both of which had to be translated from French.

George Sarton's article *Evariste Galois*, published in the scientific journal *Osiris* in 1937, introduced Galois to English readers. Drawing his material largely from Dupuy, Sarton's short biographical work lacks Dupuy's objectivity. In fact, Sarton's article is unashamedly passionate, a kind of hagiography. He uses sweeping statements such as: "No episode in the history of thought is more moving than the life of Evariste Galois"; "His name is incorruptible, indeed the apotheosis will become more and more splendid with the gradual increase of human knowledge"; "I quite realise that this self-centred boy was not attractive, and many would say not lovable, yet I love him - I love him for all those who failed to love him".²⁰ Despite his mawkishness over the 'misunderstood boy', Sarton, to his credit, makes a few penetrating psychological observations about flaws in Galois' character which may have contributed to his early death. Sarton hit the mark with this insight: "There was in him a hardly disguised contempt for whosoever did not bow spontaneously and immediately before his superiority; a rebellion against a judgment which his conscience challenged beforehand; a sort of unhealthy pleasure in turning his contempt entirely against himself. Indeed, it is frequently observed that those people who believe that they have most to complain of persecution could hardly do without it and, if need be, will provoke it. To pass oneself off for a fool is another way, and not the least savory, of making fools of others."²¹

These perceptive observations by Sarton provided a few clues toward the solution of my problem. Galois' personality was beginning to develop; my solution was beginning to emerge.

The book that made Galois known to a much wider circle of English readers is *Men of Mathematics*, written by Eric Temple Bell in 1937.²² In a chapter titled *Genius and Stupidity*, he portrays his subject as a misunderstood genius surrounded by envy, spite and foolishness.

It is a very colourful book, written in a rhetorical style, full of hyperbole, unqualified assertions, exaggerations. A professional historian of mathematics, Bell raises the pure mathematicians to the status of supermen. For him, the mathematicians are the modern heroes, deserving the veneration that was accorded to kings and conquerors. He saw mathematics as the new religion, with God as the primal geometer and the pure mathematicians as his prophets. But, as Bell rightly knew, a religion needs its heroes and martyrs, and this may well be the reason he chose to write about Galois in the manner he did. What better martyr than one killed at the age of twenty at the hands of ignorance and stupidity? As he was not a creative mathematician, Bell served mathematics by raising statues and making legends. Unfortunately, in his zeal to spread the faith he twisted and rearranged facts to suit his purpose. For instance, Bell created the legend that Galois discovered his findings in a fit of inspiration on the eve of his fatal duel. Yet the dates of manuscripts and their submissions to journals and societies make it clear that those findings were made over a period of several years. As a myth-maker Bell had no time for the man, and the man is to be the subject of my novel.

The only book length biography of Galois in English is Leopold Infeld's *Whom the Gods Love*, written in 1948.²³ This is a curious work: it is a mixture of fact and fiction, accurate scholarly research and speculation that suits the author's purpose of depicting Galois as a victim at all times. In many ways it is a fictional biography - a work that anticipates my own. It works well as a biography, but, in my opinion, fails as a work of fiction because it does not have the tone conveyed by writers such as Marquez and Banville. His expression is often clumsy, and his Galois lacks psychological depth. His character is the cliched Romantic notion of genius thwarted by society; a character without flaws or faults, blameless in whatever he does. There is no light and shade in the character - ingredients necessary to a good novel. In fact, like Bell and Sarton, Infeld also raises his subject on a pedestal, referring to Galois as "perhaps the greatest mathematical genius that ever lived."²⁴

A victim of political intrigue himself, Infeld saw his subject in a similar light. Galois is depicted as an innocent youth, seduced by a woman who, acting as an agent for the police, succeeds in luring Galois into a fatal duel. He calls this woman Eve Sorel, and represents her as a prostitute. The facts are quite different: subsequent research by Infantozzi has revealed that her real name was Stephanie Dumotel, the daughter of the resident physician at the sanatorium where Galois spent the last months of his life.²⁵ The plot thickens: Infeld makes the adversary a police agent as well, even though no less a writer than Alexandre Dumas in his *Memoirs* states explicitly that Pecheux d'Herbinville, the adversary, was a loyal Republican. Galois himself in a few letters written to friends just before the duel states that his opponent was 'of good faith', that is, a Republican, like himself.

What prompted Infeld to write such a biography? He was a mathematical physicist by training; he worked with Einstein on the Theory of Relativity; and, later, wrote books on physics intended for the general reader. He states in the foreword that he was given the idea by a friend, a fellow writer who, upon hearing the facts about Galois, urged him to write a book. When Infeld complained that little had been written about the young mathematician, his friend replied that he could invent as much as he pleased. This gave him the idea of writing the book, but what drove him to complete the book? Again, in his foreword he states that writing the book was for him "a needed escape in times of fear, doubt, adversity."²⁶ Galois was for Infeld more than just a subject of biography; in the end, the character was possibly more Leopold Infeld than Evariste Galois.

How would the present work differ from Infeld's? First, and foremost, mine would 'read' more like a novel. There are sections of Infeld's work that are not integrated into the

narrative of Galois' life; that read like historical tracts placed in the book for information. I would weave and textualise such material into the narrative, so that the historical events of the day were inseparable from Galois' life. As well as this, I would correct the errors made by Infeld, and provide an explanation for the duel that conforms to the known facts. Apart from these obvious differences, my work would provide a more complex solution to the problem of Galois' personality. It would focus on important points omitted by Infeld: the inner tension, the contradictions, the self-destructive elements of Galois' nature.

In asking what prompted Infeld to write his book, the question turned on me and struck me with a palpable force. Infeld used Galois to allay his own fears and insecurities, to exorcise his demons through a kind of identification with Galois. Is this perhaps always the relationship between subject and biographer? Does the subject provide the biographer something that is lacking in the latter's life? True, a biographer might spend precious years researching his/her material, and more years in painstaking assessment and analysis, and more years yet in labouring over the writing of the text. Flesh and blood sacrificed to paper and ink. Why? Would anyone go through so much if some reward were not there in the process, let alone the end result? The process helped Infeld live with his fears. Why did I want to write about Galois? What did I hope to gain from the laborious exercise?

As a teacher of mathematics and a writer of fiction, in recent years I have felt a need to combine these seemingly unrelated areas of intellectual activity. Galois occasionally surfaced as a possible means of fusing the two, but nothing more eventuated until a colleague suggested that a higher degree by research might offer the conditions whereby such a fusion could occur. As well as a thesis for a higher degree, the work might also be accepted by a publisher as a novel. The idea appealed to me, even though I couldn't help feeling sorry for Galois. How many people had capitalised on his unfortunate life? How many had profited precisely because he had suffered? But it was not all one way: I would also toil in reclaiming Galois' life and presenting him as a complex character. Perhaps I would do as much for Galois as he for me - after all, the relationship between writer and biographical subject is not so much parasitic as symbiotic, based on trust and mutual betterment.

Apart from fictional biographies, I also read a number of political, social and cultural texts to acquaint myself with the prevailing atmosphere of the times. In order to provide the setting for the novel, I researched texts that contained accounts of Parisian life at the turn of the nineteenth century, including paintings and illustrations of fashion, architecture, cityscapes, and the occupations of different classes of French society.

After his failures to enter the Polytechnic Galois threw himself into radical politics, becoming an ardent Republican. I had to familiarise myself with different political groups of the day, such as the Royalists, the Bonapartists, the Bourbons, the Republicans, the Socialists, the Utopians, the Saint Simonists, the Anarchists. As Galois' actions in the last two years of his life were often due to confrontations with members from these groups, I had to know the policies of each group and which section of society they represented. A text that was invaluable in this regard is Louis Blanc's *The History of Ten Years 1830-1840*.²⁷ Blanc was a Socialist who wrote during this turbulent period. Though his scholarly book is not always objective, written as it is from the perspective of 'the people', it does nevertheless contain a wealth of information about the various political groups, the leading figures of the day, and a plethora of incidental material invaluable to a fictional biographer. He also mentions Pecheux d'Herbinville, the man who killed Galois, depicting him as a brave Republican. This reference further discredits Infeld's theory that Galois' adversary was a police agent.

Another book that offered insights into the political and social atmosphere of Paris in the 1830's is Stendhal's novel *The Red and the Black*.²⁸ This was quite relevant in that its

central character, Sorel, a young man of Galois' age, is obsessed with working his way into Parisian upper class society. Sorel's desire and ambition to be accepted by the aristocracy, parallels Galois' struggle to enter the prestigious Polytechnic and his need to be recognised and accepted by the mathematical elite such as Cauchy and Fourier.

The political upheavals of the day were reflected in (or were they influenced by?) the changes taking place in literature, art, drama, music. The political reaction to conservatism through revolution and the growing strength of the voice of the people was echoed in the cry of the Romantic movement. The cool marble forms of Classicism, which expressed the values of the aristocracy, were being challenged and shattered. At the time the theatre in Paris had enormous influence, and writers such as Victor Hugo did much to spread Romanticism. In art people like Delacroix gave it further impetus through paintings such as his 'Liberty leading the People'. Perhaps it is no coincidence that challenges were also being made to Classical Euclidean geometry. The postulates in Euclid's 2000 year old text *The Elements*, which were considered irrefutable truths, were being questioned. Quite independently of each other, the Russian mathematician Lobachevsky and the Hungarian Bolyai proposed alternative geometries which were based on curved not plane surfaces, and in which the sum of the angles of a triangle could be more or less than 180 degrees. Galois' life must be seen in the context of this turbulence; in fact, the radical nature of his propositions and their terse exposition can be regarded as expressions of the Romantic movement. Can there be revolution in mathematics? Some would argue that mathematics is evolutionary by nature, growing and developing through what has been done by others. But ideas, whether political or mathematical, do not exist in isolation. In Galois we see how a mathematician can absorb the work of his predecessors, challenge it with his own ideas, and produce something new from the fusion.

In order to appreciate Galois' work, to place it in its historical context, and to trace its precedents, I read a number of books dealing specifically with Galois and with the history of mathematics. Ian Stewart's *Galois Theory* gives an excellent synopsis of Galois' life, followed by a lucid explanation of Galois' findings, and an investigation of the developments arising from these findings, which now constitute Galois Theory.²⁹ Galois' original papers, edited by Bourgne and Azra in their work *Ecrits et Memoires Mathematiques d'Evariste Galois*, were also valuable, though more from a fictional point of view.³⁰ Perhaps Galois' personality comes through not so much from the mathematics (indeed, it might be argued that mathematics is an impersonal language, denying the individual in expressing the universal) as from the scribbles and sketches in the margins of these papers. On the back of his mathematical memoirs we even find transcriptions of portions of letters sent to him by the woman responsible for the fatal duel. It is in these hastily written asides, in the words 'I have no time' scribbled on the eve of the duel, that we glimpse the youth of twenty, writing feverishly, both to overcome the fear of death and to secure his place in the future.

Three books on the history of mathematics which were invaluable to the project are: H. M.Kline's *Mathematical Thought from Ancient to Modern Times*,³¹ and D.E.Smith's *History of Mathematics*,³² and *A Source Book in Mathematics*, which contains an English translation of Galois' document addressed to Chevalier and written on the eve of the duel.³³

2.3 *Writing the Novel*

I encountered numerous problems in the process of writing of the book - problems related to narrative voice, technique and form. From the outset my aim was essentially to write a novel. I felt that this form would best embody the solution to my problem of reclaiming Galois' life. Whether or not I have succeeded is a matter for others to decide - perhaps literary critics, lecturers in creative writing courses, a mathematician with a knowledge of literature, or a humanist with an interest in mathematics. In working toward my solution, I was always conscious of the need to balance fact and fiction, without distorting or contradicting accepted facts. Crucial to the work was the need to have the narrative voice rising clearly above the historical information. The narrative voice and the time structure were the two major technical problems. I wrote a first draft in the third person, present tense. However, even before completing this draft, I felt that Galois wasn't coming through as urgently as he should, even though all the action revolved around him, and everything was seen through his eyes.

The idea of recasting the work in the first person seemed promising: a first person narrative would make Galois more immediate, and it could be achieved with few grammatical changes, as most of the alterations would be a substitution of 'I' for 'he'. In this draft I had Galois addressing an anonymous future biographer, whose presence provided a kind of justification for the projection of Galois' thoughts. This approach presented insurmountable technical problems. There are incidents in the story when Galois is caught in a whirlwind of activity, when he is swept away by his passions. How were these intense moments to be conveyed by a first person, as they were happening? How can a person convey his rage in the instant of experiencing that rage? This approach had to be abandoned, together with the future biographer.

I had to find another narrative voice. My problem now seemed even more like a mathematical problem, which very often requires numerous approaches before one finds the right point of entry, and then this point of entry may in turn lead to numerous incorrect solutions before one discovers 'the solution'. I thought about multiple narrative voices: having different characters reminiscing about Galois, but this approach would result in a collage-type Galois, and I wanted Galois to be immediate, vital, possessing all the self-centredness of adolescence. I did not want to abandon the first person voice, so I had to change the tense.

The third and final draft resulted in a first person, present tense narrative, with shifts into the past and hypotheses about the future. It is the night before the fatal duel, Galois has just completed his eleven page mathematical last will and testament. In reading over this document, he recollects significant events in his life and speculates about what is to come. This is done in a non-linear, at times chaotic manner, to contrast the disordered life with the precision of the mathematical document (the English translation obtained from D. E. Smith's *A Source Book in Mathematics*) which serves as a kind of rigid framework.

The contrast is further enhanced by means of a typographical device. I have used the lower case 'i' as the symbol for the Galois of my creation and the upper case 'I' for the Galois in the mathematical document. This serves not only to suggest the possibility of alternate selves, but it also alludes to the fact that i is the mathematical symbol for the square root of negative one, which is referred to as an imaginary quantity - all of which ties in well with the imaginary nature of the character.

The amount and the level of mathematics to be contained in the novel was another issue that proved difficult to resolve. As this was a work about a youth obsessed by mathematics, often pursuing it with monomaniacal intensity, I needed to convey something

meaningful concerning Galois' preoccupations, a general history of his subject, the mathematicians who influenced him, the nature of his discoveries. Again I did not want to present this material in slabs, as Infeld had done; I wanted to make it dramatic, part of the narrative, a fibre in the weave. Some of the mathematics could be incorporated in a manner that would engage the general reader; other parts were more problematical. Galois' discoveries were in an area of abstract mathematics, and they are difficult to follow even by competent mathematicians. This in fact was one reason why his work was not appreciated in his own lifetime. It is essentially abstract mathematics. How does one convey such mathematics? How does one convey a piece of music in literature, or an abstract painting? After giving a hint or a flavour of the work, one must refer the interested reader to the source. And this is what I have done with the mathematics.

The only difficult technical mathematics in the work is the material contained in the long letter Galois wrote on the eve of the duel. I have used this material for dramatic effect: to highlight the tension Galois must have experienced that night - a night in which his mind vacillated between thoughts of the most abstract mathematics and the certainty of his impending death.

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***i* = Galois**

A novel

Tom Petsinis

*Imaginary numbers are a fine and wonderful
refuge of the Holy Spirit - a sort of amphibian
between being and not being.*

Leibniz

Evariste Galois: A Select Chronology

- 1811** **October 18** Evariste Galois is born in Bourg-la-Reine. He is the second of three children born to Nicholas-Gabriel Galois and Adelaide-Marie Demante. The eldest is Nathalie, the youngest Alfred. His father is mayor of Bourg-la-Reine and owner of a private boarding school.
- 1823** Enrols at the College of Louis-le-Grand.
- 1826-7** He is demoted. Enrols in an elective course of mathematics taught by Vernier. Galois discovers his talent for mathematics.
- 1828** Fails at his first attempt to enter the Polytechnic. Remains at Louis-le-Grand. Studies advanced mathematics with Louis-Paul-Emile Richard, who encourages him.
- 1829** **April** Publishes his first mathematical paper in the Annales de Gergonne. He is already working on the Theory of Equations.
- May-June** Submits papers on the solubility of equations to the Academy. He is discouraged by a lack of response from the Academy.
- July 2** His father commits suicide in Paris. A week later Galois fails in his second and final attempt to enter the Polytechnic. Becomes politically active. Completes his studies at Louis-le-Grand.
- 1830** Enrols as a student at the Ecole Normale, known at the time as the Ecole Preparatoire. Publishes three papers.
- July** Revolution sweeps through Paris. Charles X overthrown. Louis Philippe assumes the throne.
- December** Expelled from school. Joins the Artillery of the National Guard, which is disbanded a few weeks later by Royal decree.
- 1831** **January** Organises a series of private lectures on mathematics. At Poisson's invitation, Galois submits a third version of his memoir on equations to the Academy. As with the previous submissions, nothing comes of this.
- May** Arrested for threatening the life of Louis Philippe. Spends a month in the prison Sainte-Pelagie. He is acquitted.
- July 14** Arrested for being armed and wearing the uniform of the disbanded unit. Spends three months in Sainte-Pelagie before he is tried.
- October** Sentenced to a further six months.

1832

March Transferred to the sanatorium Sieur Faultrier because of poor health.

April 29 He is free.

May 29 Challenged to a duel by Pecheux d'Herbinville, a fellow Republican. Stephanie Dumotel, daughter of the resident doctor at the sanatorium, is involved in the duel. Galois spends the evening writing his famous last letter, in which he summarises his discoveries.

May 30 He is seriously wounded in the duel.

May 31 Evariste Galois dies in the Cochin hospital.

i have finished - my last will and testament. Eleven pages of mathematics scribbled in a frenzy, together with absent-minded jottings, sketches, deletions. Several times during the night *i* panicked at the thought of having to plead with them for a little more time. But it's all done. *i* have managed to extract my soul from an otherwise worthless life that will soon be thrown into some ditch. Let them come - *i* am not afraid. Besides, they aren't coming for Evariste Galois, the mathematician, but for that reflection cracked by the mirror leaning on the table-lamp. How distant he now seems, that youth in the Artillery uniform, as though he and *i* are connected by nothing more than a thread of faint light. It's still dark outside, quiet, not even the twitter of a swallow. Dawn must be another hour away. Good - that's more than enough time to read what *i* have written, correct my mistakes, and project the better part of myself into the future.

{My dear friend,}

i will be something like the square root of a negative one by the time Chevalier reads this. *i* didn't write everything that was in my heart, and not from shame or secrecy, but because what lies in there is trivial compared to the treasures in my mind. He knows me well though - he'll read between the lines and deduce what *i* have left unsaid. He never failed to offer sincere friendship and encouragement in times of adversity, and now *i* regret that *i* didn't always respond to that friendship. But he'll know *i* trusted him more than anyone. He'll help save my soul from oblivion.

{I have made a few new discoveries in analysis.}

Concentrate on your work, Chevalier advised, pointing to my article in Ferussac's mathematical journal. Despite opposing views concerning the means to a Republic, our friendship had grown since our first meeting several months earlier. At times *i* envied his temperament: if *i* weren't so easily agitated *i* would have been a student at the Polytechnic, working single-mindedly on mathematics. His ideals were anchored in reality, his political views were based on clear principles, his aims were definite. Encouraged by him yet again, *i* had tried to subdue my political fervour and pursue my researches, but the increasing unrest in Paris proved too distracting. How could *i* focus on mathematics when the city was on the brink of chaos? Smoke from foundries and ammunition factories blurred the sun? Signs of revolution were everywhere: the King had become more intractable in dealing with the opposition, the Church was reasserting its influence in schools and colleges, strikes were proliferating. The unrest had infiltrated the Preparatory school - despite the spiked walls, the strong gates, and Guigniault's warnings and threats. As leader of the Republican group, *i* ignored the ban on political gatherings and dismissed with contempt the extensive network of spies who reported to Guigniault. *i* was continually urging the other Republicans to be more outspoken, more active in their support. Sitting on the bench where we had first met, *i* squinted at the shining print. Unlike my first publication, which had excited me for days, the present article barely stirred me. *i* felt as though *i* had been exiled from mathematics, and the only way of returning was through the Republic.

- Don't squander your talent, Evariste.

Talent? Those old owls in the Academy didn't know the meaning of the word. They were blind, the lot of them. *i* had been there on five occasions, and still no sign of the paper *i* submitted for the Grand Prize. Fourier was supposed to read it and pass it on to the committee - the likes of Legendre, Poisson, Lacroix, Poincot. But he had died in April and

my memoir wasn't submitted. *i* had made enquiries, but there was no trace of it amongst his papers, nor at the Academy. It had vanished from under the noses of our most distinguished academicians. The only good from all this stupidity, or maybe wilful negligence, was the fact that this year's Grand Prize had been awarded to Abel, posthumously, for a memoir the Academy had lost a few years earlier. Perhaps my memoir was also buried somewhere, awaiting the same fate.

Prodded by Chevalier, *i* managed to summon a little of my former enthusiasm and over the next few weeks worked on two papers: Notes on the Solution of Equations and On the Theory of Numbers. As the ideas had been in my head for some time, *i* wrote them without much effort, dispassionately, more to please my friend than anything else. In fact, *i* was relieved when *i* sent them off to Ferussac's - it meant *i* could concentrate on the Republic once again.

The day after, having declined previous invitations, *i* finally yielded to his look of disappointment and agreed to go with him to a meeting of the Saint-Simonists. The hall was full of flushed young faces: men and women mainly from middle class backgrounds. Throughout the meeting *i* was distracted by the woman beside me, whose strong perfume wafted my way as she fanned herself.

What did *i* think, he asked the moment we stepped outside. It was a Sunday afternoon. The gardens were full of colour, the boulevards bustled with carriages and carts, the squares resounded with hawkers singing their wares and speakers promising a better world to come. Their Society would more than likely split in two, *i* replied. Bazard advocated a Republic with a strong central government, while Enfantin proposed a mystical paradise. The two were incompatible. But that was the essence of Saint-Simon, he countered. We hurried across the street, avoiding a convoy of wagons creaking and grinding under a load of newly-hewn cobblestones that spiced the air with a phosphorous smell. A union of science and religion, he continued, of body and soul. Saint-Simon had envisaged poetry in machines, and God's spirit in the engine. They may have been the ideas of one individual, but those ideas now inhabited two distinct skulls, and *i* saw nothing but division. *i* was wrong, he protested. Membership had doubled in the past six months, subscriptions to The Globe were increasing weekly, the Society was drawing some of the most promising and talented young men in France. Then *i* had better join, *i* laughed. It wasn't a joke. *i* apologised and we walked in silence for a while.

- What did Bazard mean by rehabilitation of matter? *i* asked, looking up from my cobble-stoned shadow.

He explained that industry had for too long used human beings as its cheap and dispensable driving force. It was now time to use natural resources instead of manpower. Through mathematics and science, matter could be transformed into machines that would harness nature and make it serve human needs. Once nature had been tamed, human beings would never again be exploited or subjected to degrading labour. And Enfantin? What had he meant by rehabilitation of flesh? We were now in a square churning with humanity. Students, merchants, seminarians, professionals, tradesmen, farmers - they were all proclaiming their truths, all straining to shout above each other. As we walked through the clamour, Chevalier pointed out that in developing Saint-Simon's mystical ideas, Enfantin urged people to overcome those Christian precepts that denigrated the body and made sexual relations shameful. Economic liberation wouldn't be enough, people had to be given sexual freedom if they were to realise their potential. Enfantin believed - and this was where he alienated the conservative element - that people should do away with the present idea of marriage, with all its trappings of ownership and property, and live in a communal arrangement, where men and women shared not only their belongings but their bodies. Flesh rehabilitated was a body free

of sin and guilt, restored to the glorious state before the Fall - the sublime body of the ancient Greeks, not the dirty body of Christianity.

- *Enfantin's mad, i said.*

A speaker with bare arms and red dishevelled hair stood on an upturned tub. A crowd of women were gathered around her. In a shrill voice she complained about the inflated price of potatoes and exhorted her listeners to follow the example of their sisters in Chatillon, who had banded in force and compelled the merchants to sell below the fixed price. They had better lower the price in Paris, she warned, taking off her wooden sabots and cracking them against each other. The others followed her example, creating a deafening racket.

- *Do you accept his views? i asked.*

Cheeks blazing, he replied awkwardly that he wasn't sure, and that he had yet to have relations with a woman. *i didn't believe in relations with women, i said.* The Republic would arise from purity, self-denial, self-sacrifice if necessary, not from promiscuity and self-indulgence covered in a veil of mysticism. *i would never wallow in what Enfantin advocated.* We had to overcome the flesh, not succumb to it.

Free from school for the entire afternoon, we wandered through the square for some time, discussing our views on a Republic, stopping here and there to listen to some of the more animated speakers, avoiding hawkers and beggars. From the back of a cart, standing on a barrel with rusted hoops, a bearded man was raging with all the fury of an old Testament prophet. We stood beside a grey mule harnessed to the cart.

They were being taxed to death, he bellowed, punching his left palm with a fist the size of a cannon-ball. Talk! That was all they did! Damned Chamber of Deputies! In the meantime they were being crushed to death. Seventy petitions! Sixty thousand signatures! And still no action! Foreigners imposed crippling tariffs on our goods, and all they did was talk. In some areas production costs were twice the value of the wine itself, and all they did was talk. And now, on top of everything, an icy winter had meant the harvest would be good for nothing but raisins and sultanas. They were facing ruin, and what did they get from the King, from Martignac, from the Deputies? Talk! Enough! They would fight the tax collectors. Or else they would tear up the vines and plant pumpkins and potatoes. What would life be without wine? He pointed to a fellow with a crutch - misery would be unbearable without a daily drop. He pointed to a middle-aged woman - a sip of red restored the roses of youth to her cheeks. He pointed to Chevalier - a glass before the evening promenade empowered the heart, and suddenly one was bold as Napoleon, daring as Casanova. The ancients had been right: *In vino veritas.* Not only truth, but hopes and dreams. The Church should not forget their plight, unless it wanted to offer the Eucharist with pumpkin. He urged everyone to keep in mind that without wine we were doomed to face misery, squalor, poverty, crushing injustices. More than any revolution, wine was the great liberator. Wine provided a better future. Wine, more than the words of the priest, fostered communion with God. He asked for support in their protest against the taxes on wine. They would show Martignac and his Deputies that the people wouldn't be denied their consolation, their comfort, their hope. He assured everyone - good working class men and women, poor students, retired soldiers - that if the vinegrowers tore out their vines, wine would become so expensive that only the upper classes could afford it. The crowd erupted in wild clapping, shouting, whistling. Those near the cart reached up to shake the fellow's hand. The mule began heaving and grunting.

- *Listen to that, laughed a listener. Even the mule's against the government.*

Excited by the show of support, the fellow jumped from the barrel and picked up the reins. He urged his listeners to follow him to the Hotel de Ville, where he would pour a barrel of red at the Deputies' feet, as a sign of things to come if they didn't act. Chanting `Wine not

words', the crowd followed the squealing cart. If it were up to him, Chevalier said, he would increase the tax ten fold. There was already too much drunkenness on the streets. The Republic had to be founded on solid facts, not vaporous dreams. Besides, there would be no need for wine in a society where science guaranteed the happiness of its citizens.

Further on, we stopped before a fellow addressing a small group of grinning listeners. Despite the afternoon heat, he was wearing a greatcoat shining with grease, covered in pictures, pages, newspaper cuttings of Napoleon. Sweat sparkling on his rippled forehead, blue eyes restless as wrens, he was reciting a poem, in rhyming couplets, praising Napoleon and the Empire. He was unperturbed by those standing almost under his nose, reading the articles pinned to his coat. Chevalier swept his hand over the fellow's face.

- Blind, he said.

- Father could recite pages from memory.

- Poets! he scoffed. The old Bonapartist will recreate the past under the strong intoxication of nostalgia. Plato was right: poets should be banned from the Republic.

In the middle of the square, a man was pacing a plank mounted on trestles. He wore a red cap and a wide belt from which carpentry tools dangled. As he shouted and swung his arms, the tools rattled, the beam creaked, the trestles strained. Addressing his listeners as brothers, he asked whether the others would give their life for the Republic? The lawyers? Doctors? Journalists? Politicians? No! And the working class? They were no better: they followed whoever promised better living conditions. It was the tradesmen and artisans - they were the ones who would die for the Republic. The carpenters, masons, cobblers, tailors, clockmakers. Priests had been visiting workshops, pushing the Royalist cause in the name of Christ. Wolves dressed as lambs, brothers! They mustn't trust them! Their apprentices mustn't be seduced with a loaf of bread. He had nothing against Christ, after all, Christ had been one of them. But he urged them to be on their guard against the Jesuits. He signalled to a boy of twelve or thirteen, who struggled to lift a large wooden cross onto the plank. Holding it upright with one hand, waving the other, the speaker spat his invectives, spraying those at the front. He had pulled this out of a schoolyard that morning. A plague of them was springing up all over the place. They must be uprooted, brothers! Wood for houses, for tables, for beds. Yes! Not for the likes of this. Lowering the cross, he called out to the boy, who sprang to action, handing him a bucket and brush, with which the carpenter slapped pitch onto the top section of the cross. He stuck dry straw into the pitch, then focused a magnifying glass on it. In an instant a flame burst from the pitch. Grinning, he raised the cross onto the plank and turned it upside down, making the flame more fierce. He dropped the burning cross onto the cobbles and signalled to his assistant again, who this time handed him a poplar sapling. Not crosses, brothers! Not trees of death! This was what they ought to be planting. Trees of light! Trees of life! Trees of liberty! Paris was choking with the stench of oppression. Trees, brothers! As a sign of revolt! A symbol of the future. He called on them to follow him to the schoolyard where he had uprooted the cross so that they might plant the poplar. This was greeted with cries of approval. Jumping from the plank, he raised the sapling high in the air, as though it were a flag, and marched forward with grim determination, followed by the boisterous crowd. The assistant, together with a few other boys, disassembled the plank and trestles, loaded them onto their shoulders, and ran after the crowd.

- The revolution isn't far off, *i* said.

i poked the cross with my foot: the head was still flaming, the white skin had blistered. The air was strong with paint and pitch. Destruction, frowned Chevalier, stepping over the cross. That was the result when people turned from reason. Saint-Simonists, *i* said, they were too cautious for their own good.

- Shoes! Shoes!

An old fellow with a battered top-hat approached us. An assortment of shoes, boots, sabots, slippers hung from a pole balanced on his shoulder. He extinguished the flame with a shuffling dance, picked up the cross, broke off its arms with a powerful stomp, hoisted the two pieces on one shoulder, the pole on the other, and set off, crying: Shoes! Shoes!

That evening, back in the Preparatory, as moonlight squeezed through the dormitory's louvred windows, as the city's bells struck midnight, *i* stared at the apocalyptic images appearing and disappearing in the pressed-metal ceiling. The confusion of ideas in the square had unsettled me. Who was *i*? Where were the absolutes by which *i* could chart a course for myself? As the afternoon had flared to a blazing sunset, *i* was shaken by a feeling of my own insignificance. Leaving Chevalier in the school courtyard, *i* went to the library, not to read but to be alone behind the covers of Lagrange's book on algebra. Where was my centre of gravity? Where did *i* belong? This time last year *i* had felt at home in mathematics, certain of my talent. Now? Instead of being in the great temple of mathematics *i* was adrift in blood's turbulence. Would *i* ever enter that temple again? Experience its order, equanimity, transcendence? Pythagoras had been burnt defending that temple; Archimedes, butchered for it; poor Abel, buried for its sake. If *i* was to be of some worth, if *i* was to be more than a straw in the wind, it was my duty to defend the temple, especially now that it was most under attack from conservative forces. Once the revolution had been won, the Republic instituted, father's death avenged, then, purged of anger and hatred, *i* would wash my hands and enter the temple.

{Some are concerned with the theory of equations, others with
integral functions.}

The clock across the street hammered the afternoon, each blow heavier than the last - the fourth rattling the windows. Number and Time. The two combined powerfully in matters of life and death. How many more times would the clock strike before they came? Eighty nine - a good number, prime, not overly used. And each would be like a nail in a coffin. Death was no longer a dark figure in a fog. It was fixed in time and place: tomorrow, just after six, beside the quiet lake in Gentilly. Fourteen hours to sit and wait and...? And what? Recollect? Gather the fragments that surfaced to consciousness? Use them to give my twenty years some kind of order and meaning? Convert my life into an equation that would absorb me until they came? No. Too late. My life was chaotic, subject to whims, conceits, obsessions. And even if it were possible to express it as an equation, it would be one without real solutions, perhaps without imaginary solutions - an equation whose solutions were trivial, nothing but zero.

{I have, in the theory of equations, sought the conditions
necessary for an equation to be solvable by radicals,}

Father called me into his study when *i* went home for the Christmas break. He had aged since my last visit. His dark hair had greyed, the lines across his forehead were deeper. *i* had disappointed him, he said in a flat voice, pinching the flesh under his chin. He had refused to have me demoted last year because he believed in my ability. The ash in his pipe glowed. *i* looked down at the inkpot on the desk. Was *i* responsible for his sombre look? My reports showed no progress, he sighed, picking up a sheet. How did you account for this: Apart from the last few weeks when he has worked a little, and then only from fear of

punishment, this student has generally neglected his studies. The strangeness of his character keeps him from his companions. Was this why they had sent me to Paris? He meant more to me than anyone. *i* wanted to please him, to obtain good grades, but *i* couldn't overcome the hatred *i* felt for certain teachers - a hatred that often made me play the fool.

- There's no helping you this time.

He shook his head, drew deeply on the pipe and exhaled a smokey sigh that momentarily filled the silence between us. *i* might as well gain something from the setback, he continued. Study something different. Do a course in mathematics. Placing his hand on my shoulder, he looked at me tenderly. *i* wanted to apologise, promise *i* would do better. *i* fought back an impulse to embrace him and cry in his arms. He moved to the window, pulled aside the lace curtain and gazed at the church across the town square. *i* wanted to see him cheerful again, and if that meant a course of mathematics *i* would do it.

{and this has given me the opportunity to study the theory and to describe all possible transformations on an equation even when it is not solvable by radicals.}

In a corner of the schoolyard, *i* was caught in the elm's crisp shadows. February's chill bit the back of my neck. *i* had hardly changed since coming to Louis-le-Grand. Fifteen last October, *i* could have passed for twelve. The boys who started with me three years ago had grown noticeably: pimples budded from their faces, down darkened their cheeks, wrists and ankles protruded from sleeves and cuffs. *i* clenched my cold fists, pressed my fingernails into my palms. *i* hated them all - teachers and students. They ridiculed me for being demoted. Let them laugh! A time would come when they would choke on their laughter.

- Galois the girl! Galois the girl!

A burst of warm vapour blasted my ear. Before *i* could retaliate the name-caller was sprinting across the yard.

Why had father insisted *i* study in Paris? *i* was happy at home. Mother could have seen to my education. She had taught me to read and write, introduced me to Greek and Latin, read to me from the Bible. She could be demanding, even harsh at times, especially when it came to the Bible, but *i* endured her strict ways by looking forward to father's company. Those hours we spent singing, reciting poems, entertaining guests with short sketches from Homer, Racine, even Shakespeare, who was such a favourite of father's that he claimed the name was a corruption of Jacques-Pierre. Acting the ghost scene from Hamlet, *i* would get so worked up that tears filled my eyes, and our visitors would laugh and applaud. They were bright days, happy times, a world away from this gloomy place.

Four boys were throwing fingers, adding the number each had thrown, and counting clockwise. The player on whom the counting stopped was then slapped on the back of the hand by the others. And if the count went in the other direction would the same player be slapped? If the sum were even and the count began with the same person, the direction would change the outcome. If the sum were odd, the direction of counting would make no difference to the outcome.

i suddenly recalled the tone of mother's voice: harsh and high-pitched, it rose above the noise in the schoolyard. She was reading from the Iliad. It was my favourite story - the death of Ajax. How *i* felt for the tragic character! *i* understood his dejection and that desperate last act. Often when *i* was refused something, or when *i* didn't get my way, *i* would take my wooden sword, run off to the back of the house, and pretend to be Ajax. On one occasion, buried in the maple's red leaves, *i* imagined that *i* was hovering over my prostrate

body, looking down sadly, deriving a strange pleasure in feeling sorry for myself.

There was no time for games in this place, no opportunity for make-believe, no place for privacy. Always in the presence of others, my only escape was the dark, when the dormitory lamps were extinguished and *i* could follow my imagination without interruption.

After a term in the third and final year, this demotion to the second was painful. It meant confinement in this prison extended by another six months! Rhetoric! *i* could have easily passed that useless subject. *i* had done poorly in order to spite the teacher, whose smugness *i* couldn't bear. *i* had refused to follow his rules, often submitting work that was deliberately obscure, written with the rules of my own grammar, with sentences that expressed the movement of my mind. *i* often daydreamed of a private language: magic sounds and symbols that transported me to another world. The teacher's growl would wrench me from those fanciful states. And when he read my nonsense aloud, the class howled, he grinned, and *i* concealed my delight, feeling superior to them all because *i* had set out to reduce them to laughter, to make them look ridiculous. The more they laughed, the stronger my heart pounded.

From the chapel's cross, a crow flapped to a bough above my head, where it perched and preened its wings. A large feather twirled through the elm's branches and fell at my feet. *i* picked it up, admired its shape, and reflected that it would make a fine quill. The ancient Greeks augured the future from birds. Where did my future lie? Dark feelings had been stirring in me during the past year or so, feelings not only of hatred for those around me, but a frustrated desire for something *i* couldn't define: an ambition without a goal. There was a sense of leaving childhood behind and moving toward a distant, barely audible calling, which sometimes sounded as though it were nothing more than a faint echo of my own voice, and other times a voice *i* had never heard before, calling compellingly in a language *i* didn't understand, though *i* sensed that *i* had once known it.

The bell sounded for class. The next hour was mathematics. Holding the feather in one palm, *i* weighed it against a thin spread of sunshine in the other. Should *i* make an effort? Should *i* stop playing the fool, at least in mathematics, for father's sake? *i* was now alone in the yard. A few winter sparrows were pecking crumbs of light on the cobbles. Suddenly, as though signing a resolution, *i* scratched my name on the back of my hand with the feather's point.

{It will be possible to make three memoirs of all this.}

A ghostly water-mark sprang at me from the blank sheet *i* had been staring at for the past hour. Raising the thin paper to the afternoon light, *i* could just make out the profile of a young woman. Was my mind playing tricks? *i* scrutinised the figure. It looked so much like her - the same long neck, upturned nose, curly hair. *i* crumpled the sheet and went to the window. There was already a crimson tinge in the sky. Spring was turning to summer. Tomorrow would be fine and calm - a perfect day for a duel.

{The first is written, and, despite what Poisson has said of it, I am keeping it, together with the corrections I have made.}

Has Chevalier received my reply to his last letter? When did *i* sent it? The 24th? No, it's been four days. The 25th. May's almost over. His was a kind letter, full of noble sentiments and encouragement. *i* wanted to express so much in my reply. *i* wrote that there was a kind of sweetness in being miserable, but only if one could at least hope for

consolation. But there was no consolation for me in anything? In the last month *i* had exhausted the greatest happiness possible to man - exhausted it without happiness, without hope. After that, his fine words about peace and harmony sounded hollow, bookish. This was a time for blood, not books. No peace. No pity. No harmony. Hatred - that was what *i* felt. An all-consuming hatred. But how could *i* tell him, how could *i* tell anyone, that this hatred was more hatred of myself than hatred of the world? *i* despised myself for having fallen in love, for having been deceived by her. *i* wanted to tell him that *i* was no longer the person whose intellect burned fiercely, freely. The anger *i* directed toward the Academy, toward Louis Philippe, toward the Church - it was all now focused on me. And this anger hurt, twisted my heart, squeezed tears from me. But *i* didn't tell him any of this. Why alarm him? *i* wrote that those who didn't feel a deep hatred for the present couldn't truly love the future. Yes, that would allay him, give him the impression that *i* had something to live for, while concealing from him the dark void to which *i* was being irresistibly drawn. *i* wrote that *i* approved of violence - a violence not of the mind, but of the heart. *i* would get even with those who had thwarted me and killed father. But *i* kept from him what *i* really wanted. Dear, Auguste! How often he implored me to join the Saint-Simonists, saying there were people who would care for me, love me. Love! The very word prodded my hatred, stoked my anger. *i* didn't tell him any of this though. He was like a brother, and he never failed to remind me of my talent for mathematics. He even wrote of a premonition he had: that *i* would never do mathematical work again. *i* knew him - this was his way of getting me to work. Mathematics? Impossible! My heart had completely rebelled against my head. Not wanting to alarm him, *i* wrote that we would see each other often in the first two weeks of June, after which *i* would leave for Dauphine, where *i* hoped to recuperate fully, regain my vitality and start a new life. A new life!

{The second contains some interesting applications of the theory of equations.}

- Geometry, announced Vernier.

In three weeks of arithmetic his voice had never risen above a dull drone, now he introduced the new topic as though it were the title of an epic poem he was about to recite by heart. For the first time since my demotion, *i* sat up. Geometry. The word had an appealing resonance. As he paced the platform, his words enhanced by expansive gestures, *i* forgot the snow drifting obliquely across the grilled windows, forgot my demotion, forgot my hatred. Drawn from the emotional turmoil of recent months, *i* was at ease in what Vernier was saying.

He was about thirty, with black hair fringed across his forehead and round spectacles. He wore grey gloves to prevent chalk-dust irritating his dermatitis. As he raised a text book high above his head, its image appeared skewed in the lamp's concave reflector. Euclid's *Elements*, gentlemen, he said. The Book of Books. The most influential text ever written, more so than the Bible. It had leapt across centuries, nations, languages, religions. Its relevance was timeless; its nationality, universal; its language, logic. Truth, gentlemen! Absolute, transcendental truth. We had done our exercises in arithmetic; we had added, subtracted, multiplied, divided and extracted roots. Well and good. All very useful. He would be the last to deny the usefulness of arithmetic. It went hand in hand with money, and, as we knew, coins made the world go round. It was vital to examiners, bankers, generals. It determined pass and fail; measured profit and loss; counted life and death. But, despite its prevalence in the affairs of the world, arithmetic had little to do with the spirit of

mathematics. That spirit found its first expression in geometry. The spirit, gentlemen! Think about it, he said, raising his arms. A spirit not unlike the Holy Spirit, and just as the Holy Spirit couldn't be apprehended merely by attending church regularly on Sundays, dropping a coin on a collection plate, saying one hundred Hail Marys and two hundred Our Fathers, so the spirit of mathematics couldn't be grasped by the repetitive exercises of arithmetic. Many were called, and some were chosen to serve in schools, others at a higher institutions such the Polytechnic, but few, perhaps a handful in each generation, were chosen to become initiates, to partake of the mysteries, to serve the spirit in the inner sanctum.

i stared at the brown book whose binding had frayed and gold lettering faded. And when, looking directly at me, Vernier asked which of us would be among the chosen few, my heart leapt. *i* wanted to know more about Euclid's truth. Could there be absolute truth in these confusing times, when countless groups claimed to have the truth, and the world was on the brink of chaos? Royalists, Republicans, Bonapartists, Socialists, Saint-Simonists, Anarchists, the re-emerging Jesuits - they were all active among students, all seeking to make converts to their particular truth. Perhaps Euclid, having stood the test of time, would dispel the chaos churning inside me and help make sense of the world. My attention caught by his gloved hands, *i* imagined that the book's truth was too pure for flesh.

From what was in the book, Vernier continued, unperturbed by the growing restlessness, we knew the mind of Euclid, but what of the man? Did the man matter in the dazzling light of this creation? Beyond the fact that Euclid taught in Alexandria around 300 B.C., probably summoned there by Ptolemy, little else was known about him. We didn't know where and when he was born. We didn't know his nationality. Some maintained he wasn't a Greek at all, but an Egyptian. We didn't know how he felt about the gods of the day; whether he was kind or cruel; whether he was fond of wine, or whether he had children. The personality didn't matter, Vernier declared, tapping the book. In most cases it disappeared without trace in four generations, let alone forty. What mattered was the idea, the ideal, truth. The truths in this book weren't easily grasped. Euclid had said to Ptolemy that there was no royal road to geometry. Mastery of the subject required hard work, concentration. Some of us would fall by the wayside early, others would understand enough to pass our examinations, but those imbued by the spirit of this book would find a world that withstood the might of Imperial Rome and outlived the shadow of the Dark Ages. A world to which French mathematicians had contributed greatly since the time of Descartes. The call had gone out. Who would heed it? Who would serve the spirit? Who would deny themselves for the sake of truth?

My hand shot up. Their laughter proved their stupidity: they were all insensitive to the spirit of mathematics, unable to grasp the subtlety of Vernier's words. Why did he tolerate them? Why didn't he threaten them with detention? Why was he smiling, rubbing the lenses of his spectacles, squinting as he held them up to the light? When the laughter finally subsided, he picked up another text.

- Euclid has been excellently interpreted and presented by Adrien Marie Legendre in this his *Elements of Geometry* - a text written for the purpose of teaching the subject in a modern way, and from which I'll be drawing heavily. Open your books, gentlemen, and let's commence.

Held firmly in his gloved hand, the chalk scuttled quickly across the blackboard, striking at full-stops, scratching in underlining words, sometimes screeching in its haste, causing students to wince and grit their teeth. From the back of the room, *i* kept up with Vernier and copied in my book the definitions, propositions, axioms, theorems. One idea led to another, naturally, effortlessly. *i* pondered the first definition: a point is that which has no

part. It seemed that a point was and was not. If *i* were to represent it on the page, it would no longer be a point. If *i* tried to grasp it in thought, it vanished. *i* imagined a point moving at a great speed: it was both a point and a line; a particle and a process. If *i* grasped the line, *i* lost sight of the point; if *i* focused on the point, the line proved an illusion. Astonishing! That something so intangible should be the basis of all geometry! Perhaps the indivisible point was the seed of creation. Perhaps the universe exploded from the primal point. Perhaps God was the primal point. Perhaps the soul was nothing more than a point.

As the student beside me bit his knuckles over the first problem, *i* saw the proof at once - as though a long-dormant sense had suddenly been awakened. *i* became excited, my heart beat strongly against the edge of the desk, my hand trembled and *i* couldn't keep a straight line with my writing. *i* completed the exercise in a few minutes, most of them in my head first, while my neighbour sighed and scraped the floor. The bell sounded. Shuffling above Vernier's instructions, the students bustled from the room. *i* couldn't have been more excited if *i* had just fallen in love. My mind was on fire. *i* wanted to know more. Should *i* ask him whether *i* might borrow Euclid and Legendre? *i* held back. How could *i* explain to him my feeling for the subject? Intuition? Sixth sense? No! Better keep it to myself for the time being. It would be my secret: a key to a world where only the chosen were allowed.

During the afternoon recreation hour, *i* hurried to the library, located the texts and sat at a window overlooking the courtyard and the Preparatory School, an annex of Louis-le-Grand, where students trained to be secondary school teachers. *i* picked up Euclid, felt the textured cover, then flicked through the yellowing pages, inhaling their mustiness. *i* read again all that Vernier had covered, and continued through more propositions, theorems, proofs. *i* read quickly, as though it were a biography or a work of fiction.

- Geometry!

As though surprised in an illicit activity, *i* shut the book with a thud, my index finger between the pages. Peering over my shoulder, the old librarian said it was the language of the future. When Greek and Latin died out, geometry would be the living language of the entire world. He became thoughtful, hairy nose wheezing at each breath. *i* was struck by the thought that, despite the book's eventual decay, the ideas of geometry would remain bright and fresh for another two thousand years. Those ideas were like parasites, burrowing into suitable minds, feeding on young thought, moving through time in the vehicle of the human skull. *i* would give my mind for the sake of those ideas, sacrifice myself if it meant the birth of a new theorem. And as the librarian hovered over me, as two boys chuckled at a corner table, as a churchbell was muffled by falling snow, *i* placed my right hand flat on Euclid's text and vowed to become a mathematician. Ignoring his chatter about mildew damaging many of the books, *i* pushed back the chair and stood, but he caught me by the arm and pointed out that though the books weren't for loan, they wouldn't be missed for a few days. In the corridor *i* embraced them, as though my life depended on them.

{The following is a summary of the most important of these:}

In the refectory at supper time, *i* sat uneasily, head bowed, staring at the ceiling's triangular beams warped in the spoon's hump. Teased by some, taunted by others for my recent seriousness in class, *i* responded with grim silence. As cutlery clattered and conversation circled the tables, as the student beside me grovelled in his bowl, stuffing his face and mashing his words with boiled potatoes, *i* kept my hands under the table, fingers tightly crossed, determined not to touch a scrap of food, despite hunger churning in my stomach. From now on my sustenance would be pure geometry.

The last bell prodded students along chilly corridors, drove them to their dormitories. For me, it was a welcome sound, now more than ever. It signalled liberation, solitude in the dark, a time when *i* could finally get away from the others and concentrate on geometry. Two weeks since my introduction to the subject, and *i* was proving theorems which baffled the others - proving them without paper and ink, as if *i* saw the proof in the very theorem. This facility, this seeing, was enhanced at night, when *i* lay in bed and the darkness was a vast blackboard on which *i* projected my thoughts. Two weeks, and the initial stirring of interest had grown from enthusiasm to a kind of passion.

A teacher inspected the dormitory and extinguished the lamps. Until now *i* had looked forward to the period between lights-out and sleep because *i* could finally pursue my own thoughts and fantasies. *i* could follow Alexander to India or plan with Napoleon for the third coming. Now, as some snored, others whispered, and a few thrashed about on their straw mattresses, *i* reached under my bed, located the library books and placed them on my chest. *i* proposed a problem from Legendre's text, and suddenly its proof was there, projected on the dark ceiling: the lettered diagram, followed by lines of Euclidean logic, until the final Q.E.D. *i* recalled other proofs and solutions in their entirety: detailed diagrams, intricate arguments, some of which *i* had only glanced at during the course of the day. *i* had always been good at remembering names, dates, lists of Greek and Latin words, but that couldn't compare with this newly-wakened faculty. *i* tested myself by proposing problems of my own, and in a flash *i* saw their proofs, as though they were physical objects. Chess players could visualise the board and perform complicated manoeuvres in their head - was my talent for geometry similar? And what if it was more than talent? What if ...?

{¹⁰. From proposition II and III of the first memoir, we perceive a great difference between adjoining to an equation one of the roots of an auxiliary equation and adjoining all of them.}

The dormitory's clock struck once. The last whispers had turned to wheezing. With Euclid's text on my chest, *i* drifted off for a few minutes, dreamt vividly, then woke with a start. *i* felt feverish. In one dream *i* was Jason leading the Argonauts to the cave of the Euclidean point. The challenge had gone out: whoever grasped that elusive entity, that nothingness, would possess the greatest treasure, the very source of the physical world. *i* struggled through criss-crossing lines which threatened to imprison me in grids and grills. Without flinching *i* walked barefoot over jagged triangles, pushed forward through the surrounding chaos. A man appeared and held up his right palm: an open eye was circumscribed by an equilateral triangle. The eye winked, and the man vanished. Further on, two pythons were twined in a tight braid. Unwinding as *i* approached, one becomes a circle; the other, coiled itself into a spiral. The circle hissed as *i* stepped inside it to continue my journey. *i* entered the cave, but instead of finding the point, *i* was confronted by a woman who offered me a golden sphere. No! The sphere wasn't worth the point. Her presence became a challenge: a test to determine whether *i* would be initiated into the secrets of geometry. Did *i* have the strength of character, the purity of soul, for the transcendent point? Was *i* worthy of the source. She spun the sphere on her finger and whispered that she was the source of the world. My heart quickened, body tingled, limbs began to loosen. Another minute! If *i* withstood the temptation for another hundred heart-beats the point would appear. *i* began chanting that a point was that which had no eyes, a point was that which had no mouth, a point was that which had no body, a point was...

Blood was hissing in my ears, my neck was moist. The words 'a baptism of fire' echoed in my head as *i* dozed off again. It wasn't a deep sleep though: *i* hovered in that region of no-man's land, that area between consciousness and dreaming, where lucidity alternated with the ludicrous. Euclid's fifth postulate flashed to mind with startling clarity. And the next instant *i* was on a flat endless field, running frantically between furrows, determined to reach their point of convergence at the horizon.

A bell rioted in the dark. Lamps were lit, windows swung open, louvred shutters pushed out to the black morning. Feverish, *i* could hardly lift my head from the pillow. *i* located the warm book under the blankets and drew it to my chest.

- Up Galois, barked the teacher.

i felt weak, feverish. My throat was dry and *i* could barely raise my words above a raspy whisper.

- Too skinny, boy! That's your problem!

The bell rang furiously and the boys scurried out, a few still dressing as they ran. He instructed me to rest for the remainder of the morning, and left shaking his head, holding the bell by its tongue. Alone in the still dormitory, *i* felt a tremor of excitement. Privacy was precious in this place. *i* shouldn't waste it dozing off. *i* took out Legendre's text from a side cupboard, propped myself on the pillow and opened it on the title page. An inky fingerprint had been pressed beneath the year of publication. *i* read fluently, admiring the elegant language, skimming theorems and constructions, often anticipating detailed proofs. Outside the darkness had started to grey. No more reading myths and novels! Fiction was a waste of time! Nothing but diversion for the idle. Enough of Homer! From now on it would be Euclid. Any fool could pick up a novel, read it from cover to cover, and understand it as thoroughly as any professor. Two professors might read the same novel and disagree as to its merits. Where was the truth in fiction? The permanence? It was all so arbitrary, gratuitous, whimsical, chaos parading as form. Rubbish, all of it! *i* wouldn't exchange a single geometrical proof for the collected works of a dozen authors. Geometry or nothing. Truth, not fiction. There was no disputing geometry: Euclid's fifth postulate was true in third century Alexandria, and it would remain true on the North pole in two thousand years. *i* was glad the others found geometry difficult: that proved it wasn't for everyone. The masses would never be able to enter the holy shrine. It was reserved for the select few in any generation: those who would add to the body of knowledge. And the others? They could have their novels. Let them identify with fictional heroes. *i* had outgrown that nonsense. Reading Euclid and Legendre *i* felt...What did *i* feel? *i* had no feelings when *i* concentrated on those theorems and proofs. *i* was no longer Evariste Galois, the insignificant schoolboy. *i* became a new person. No, not a new person but a being that transcended the individual: a sense of oneness with the eternal truth and order of geometry. Yes, *i* had suffered the humiliation of repeating the class, but through humiliation *i* had found the truth. *i* would become a great mathematician, of this *i* was certain.

{In both cases the group of the equation breaks up by the adjunction in sets such that one passes from one to the other by the same substitutions,}

Their sarcasm and laughter couldn't distract me from my single-minded pursuit; on the contrary, it spurred me forward, strengthened my belief that geometry was for the chosen few. *i* lived geometry with a passion verging on obsession, with a zeal that drove those imbued with religion. Rhetoric, Latin, Greek, Physics - they had all become unbearable

because they dragged me away from geometry, the purest of all languages.

Preoccupied, at times to the point of abstraction, *i* now saw geometrical problems all around me. One evening, returning to the dormitory from the latrines, *i* stopped beneath the elm in the courtyard and gazed through the bare branches at the sky. The night was crisp and clear. The stars were pin-pricks made by a compass, like perforations in the great master plan that separated heaven and earth. Through my breath dispersing in vapour, *i* connected a group of stars into a regular pentagon. The origin of geometry was up there. A primal star died in an explosion, and from its death countless others were born. The night sky was full of geometry. Given three fixed stars, three distinct lines could be drawn, and one triangle. With four stars, six distinct lines were possible, four triangles, one quadrilateral. With five stars, *i* saw at once that ten lines were possible, ten triangles, five quadrilaterals, one pentagon. As the different figures quickly outnumbered the quantity of stars, it followed that given an infinite number of stars there had to be an even greater number of geometrical figures. Every conceivable figure could be found up there: figures so perfect they could never be drawn on paper, whose perfection would be spoiled by a line, even though it were thinner than a thought. God was a geometer. He designed the universe with nothing but a compass and an unmarked straight-edge, and his blue-print was the night sky, which he unscrolled to plan for the future. What was the individual compared with the wonder up there? The human condition could only be overcome through contemplation and appreciation of the night sky's geometry.

- Presentation, said Vernier, tapping my scrappy work-book. Don't be in such a hurry to arrive at Q.E.D.

Impressed by my understanding of the subject, he had encouraged me to read widely, recommending not only text books, but biographies of mathematicians. At the same time he reproved me for my sketchy setting out and my impatience with details.

- How did you arrive at this? he asked.

Taciturn with the other teachers, *i* was more responsive with him, though concealing this behind a surly expression. *i* grudgingly explained the missing steps in my reasoning. The whole exercise was a waste of time. The problems were trivial, intended to test fools like the boy next to me, who was still struggling with cyclic quadrilaterals, which *i* had mastered in the first few days of the course. Fool! Sitting there picking his pimples, drawing circles, and within each circle sketching a woman with legs spread obtusely apart.

Having dismissed the class, Vernier removed his gloves and slapped them against a desk, sending up a cloud of white dust. He started to lecture me on the nature of original ideas. Unless communicated clearly, ideas were no better than vapour, and one's head may just as well be empty. An idea became real when shared by two people. Many people had ideas, intuitions, remarkable insights, but few were able to translate them from the personal to the public domain. How many great ideas had never seen the light of day? How many remained in the dark cranium through a lack of expression? Descartes had put it well: when one dealt with transcendental matters, and nothing was more transcendental than mathematics, one had to be transcendently clear. *i* had a tendency to be far too impatient, he said, staring at me through the thick lenses. *i* was too quick for my own good. *i* often failed to show the necessary steps in flying toward my goal, which *i* somehow saw even before *i* set ink to paper. A proof didn't lie in the final Q.E.D, but in the process that lead to it; in the logic that bound the parts into a harmonious whole. Not only omissions, at times my very exposition was so terse, my syntax so cryptic, that what he saw before him could pass for a language of my own making. The long-winded lecture annoyed me. What did he know about the mathematical mind anyway? He had acquired just enough mathematics to teach a class of plodders. *i* was about to tell him that there was one law for the ox, another for the eagle, when

he removed his spectacles and squinted feebly. That squint made me swallow my words, and *i* reminded myself that he was the only teacher who recognised my talent.

As a break from the intensity of theory, *i* enjoyed reading biographies of mathematicians. *i* was moved by the life and work of Archimedes. His Quadrature of the Parabola, by which he calculated the area of a parabolic segment, astonished me. The Rhetoric teacher was forever prattling about the beauty of poetry: Pindaric odes, Catullan lyrics, Petrarchan sonnets. Yet none of this, nor any poetry ever to be written, could compare with the beautiful way in which Archimedes showed that the area of a parabolic segment was four-thirds the area of the largest inscribed triangle. As for Archimedes the man, *i* admired him because he considered his useless investigations of circles more important than the practical ingenuity which calculated the amount of gold in king Hieron's crown. *i* agreed with him: pure mathematics was the noblest pursuit because it had least to do with the corrupting influences of the world.

My admiration for Archimedes wasn't restricted to his work and life: the manner of the old man's death left an equally deep impression on me. Like most fifteen year olds, until recently my image of a hero had been the fighter who gave his life for others. Now *i* saw that there were four kinds of heroes. The first, and least, the Three Hundred Spartans, who combed their long hair in the face of death. Second, Socrates and those who sacrificed their life for a moral or ethical ideal. Third, the martyrs, like the young Saint Sebastian, who died, and maybe still die, for their faith. Fourth, and highest, Archimedes, the man who died for nothing more than a circle. As the Roman sword was raised above his head, Archimedes wasn't thinking of his country's welfare, he wasn't strengthened by a sense of moral or ethical righteousness, he wasn't looking beyond the blade to paradise - at that instant, sitting in a circle drawn on the sandy floor, he vanquished the sword through geometry. And when the sword fell, the old man was embraced at once by the circle he loved.

Was this story fact or fiction? *i* asked myself that question many times. Who could say for certain. Biographers were novelists of sorts, with an eye for the colourful, an ear for the dramatic, perhaps a sixth sense for what was going to sell. Even if that wasn't how Archimedes died, two thousand years had turned the legend into fact. His death moved me so much, sometimes *i* lapsed into reveries in which *i* imagined the same fate befalling me. Religion, politics, poetry - they all had their young martyrs. Why not mathematics?

In contrast to my veneration of Archimedes, *i* was envious of Pascal's precocity. At the age of sixteen he wrote his famous essay on Conic Sections, which contained what was later called Pascal's Theorem. At nineteen he invented a calculating machine. Comparing myself to my compatriot, *i* found that my attitude vacillated: sometimes *i* was goaded to more concerted study; other times, gnawed by self-doubt. *i* would be sixteen in October, and what had *i* done? Nothing but dream of great works! But when doubt threatened to get the better of me, *i* reminded myself that *i* was still a relative newcomer to geometry. Pascal had been tutored in geometry by his father from the age of seven or eight. If mother had introduced me to mathematics, instead of spending all that time on the Bible, *i* might have made a few discoveries by now. Still, *i* was making rapid progress. Pascal discovered a minor theorem concerning a hexagon contained by a conic section. There was six months before my sixteenth birthday - enough time to discover something important.

{but the condition that these sets have the same substitution holds with certainty only in the second case. This is called a proper decomposition.}

She was playing a lively melody on the piano as *i* left the sanatorium to post that letter to Auguste. Walking through the poorer quarters where the ravages of cholera were most devastating, *i* was preoccupied with thoughts of being infected by the disease. In a day *i* would be reduced to nothing but skin and bones; in two, the death cart would rattle me off to some ditch, where *i* would be thrown in with a hundred others. There was no brotherhood in life, it may as well be in death. Why not? What was there to live for? *i* turned to the sound of women crying. Was my life more important than the person who had died or was dying in that room up there? Death by cholera: one among thousands who died every. One, absorbed by a black nothing, multiplication by zero. It would be better this way. The handful of people who still cared for me wouldn't blame themselves for anything. Had father felt this emptiness? Now, more than ever, *i* understood what he must have gone through.

- Father, father, *i* said aloud.

At an intersection of several streets an old woman pinched my cheek and laughed. The air was thick with chlorine, pine from branches heaped on a fire, refuse spilling from carts. Some said the epidemic had been caused by contaminated water. Perhaps if *i* drank from that fountain. Knee-deep in garbage, a scavenger was delivering a foaming protest to a group of heavy-eyed onlookers. They had a right to live, he spat out his words. The authorities wanted to clean up the city by using a new type of cart: one that would make it impossible to pick through. How were they going to make a living? They wouldn't stand for it. The plague wasn't caused by rubbish. He had been picking through rubbish all his life, and look at him: fitter and stronger than all the lily-livered ministers put together. They had as much right to earn their livelihood as any other group. It wasn't their fault they didn't get an education or a trade. If the authorities used the new carts they would smash them, burn them, throw them in the river.

At the fountain *i* rattled a metal bowl attached to a chain. Dazzled by the sunlight glancing off the water in the bowl, *i* closed my eyes and drank. *i* recalled Ogin. It was during my first walk in the prison courtyard, and *i* was surprised to see children wandering around, playing games, conversing with the prisoners. They were the gamins, *i* was told. The orphaned, the abandoned, the homeless, who roamed Paris like feral animals, begging, stealing, in some cases becoming hardened criminals before the age of twelve. The authorities had calculated it was cheaper on the public purse to round them up and house them in an annex here, than have them on the streets. They were kept here until the age of thirteen, when they were considered old enough to know the law and fend for themselves.

Over the next few afternoons *i* watched as about twenty children sat cross-legged on the warm cobbles and listened to a scruffy, bearded fellow, whose surly manner had isolated him from the other prisoners. Was he entertaining the children with tales and legends? Stories of Napoleon? Or was he a teacher giving them lessons? If so, *i* might assist him by offering lessons in arithmetic. The ideal Republic in prison, *i* mused, approaching the fellow as the children scattered after another session, their bare feet slapping the cobbles.

- They listened to every word, *i* said.

Sitting on a bench, the fellow turned slowly and gathered me in a watery look.

- Aren't you the one who threatened the King?

i told him that a few prominent Republicans were making too many concessions to the King, forgetting the sacrifices made by the people in the July revolution. He nodded wearily, combed his beard, examined the ashen strands caught between his fingers, and blew them away with a light breath.

- I've been telling them about paradise.

- Religious fairy-tales? *i* asked, disappointed.

Not at all, he replied, forcing a smile through his thick beard. He was telling the children about the Republic, Utopia, Paradise - call it what *i* would. The best possible world for them. With a forefinger severed at the middle joint he pointed to a few girls hopping on numbered squares. Paris had to burn for Paradise to arise. He became more animated. The whites of his eyes were streaked with red. He was an anarchist, and they were his disciples. Providence had brought them together. He had preached the purity of fire outside, but nobody would listen. They laughed, threw slops, set their dogs onto him. In the end they locked him in here. But it had been a blessing, a real blessing. The children weren't infected by bourgeois morality. They were empty vessels - vessels he filled with stories of Paradise, of a world with love and material comfort. And they listened when he would tell them that the way to paradise was through anarchy. Yes, they would listen and look upon him as the loving father they never had. His ideas had taken root in their little bodies. When they left this place, they would carry the poppies of anarchy in their hearts and the vision of Paradise in their minds.

- And do you know, friend, he confided in me. Some of my little disciples can't wait to burn down Notre Dame as the first step toward Paradise on earth.

He looked away for a moment, chewing a thumb nail bitten to the quick, then turned his back and chuckled in a way that suggested he wasn't right in the head. Later that afternoon *i* approached a girl from the group. She threw a white pebble which clattered and stopped in a square numbered four. Grinning mischievously, she told me that Ogin was crazy, and the only reason they listened to him was because of the bonbons he gave after each session. Was she telling the truth? Was Paradise nothing more than a sweet? Or was that sweet a way of misleading the authorities? A means of protecting father Ogin?

{In other words, when a group G contains another group H , the group G can be divided into sets, each of which is obtained by multiplying the permutations of H by the same substitution, so that $G = H + HS + HS' + \dots$ }

The last time *i* spoke to Ogin was in the dead of winter, during my second imprisonment, after *i* had been in Sainte Pelagie six months. He was sitting on his bench, a ragged blanket pulled over his head, sniffing and whimpering that we were all doomed and his little angels would never see paradise. On the few occasions we had spoken *i* was impressed by the fervour with which he expressed his vision of a new world: a heaven on earth brought about by his little angels.

- What do you mean? *i* asked.

- The pestilence, it's coming. Paris will become a vast graveyard.

He wiped his glistening moustache with the back of his hand. Had he cracked? Had the role of a prophet got the better of him? Had he been reading Revelations? And *i* recalled my fear as a child when mother would read certain chapters from that terrible book. Her melodious voice would plunge me into scenes of chaos and destruction, from which *i* was saved by the thought of father.

- What kind of pestilence?

Cholera morbus, he grimaced, his forehead creasing as he looked skyward with eyes opened wide. It had started in the Ganges, a river teeming with religion and pollution. Russia, Poland, Bohemia, Galicia, Hungary, Austria: they had all been devastated it. Only last week the first victims were reported in London. We were next, he said, calling me brother. There was no escape. It would be better to take one's life than suffer the agony of that pestilence. He had spoken to sailors who had witnessed its ravages. Its victims were like the living dead,

they said. A person was healthy one day, skin and bones the next. The flesh turned inky blue. The eyes became hollow and shrivelled to half their size. The mouth became white, the breath cold, the voice a raspy squeal. The pulse weakened, became feeble as a sparrow's. Oh, *i* would know it in myself. It began with a loss of balance, with the sound of bees hiving in one's ears, with vomiting, lethargy, a feeling of emptiness. Then one felt an iciness, first in the fingers and toes, then it spreads through the entire body. This was followed by diarrhoea, violent cramps, loss of breath. Depending on the victim's constitution death followed in several hours or a few days. There was no escape, no cure. Death was a blessing. He leapt from the bench, brushed past me and ran across the courtyard, the blanket flapping around his legs. The day after, he threw himself down a stairwell.

{And it can also be divided into sets which contain the same substitutions,}

i wanted to write two or three letters this morning, but all *i* could do was stare at the blank sheet. My thoughts - leaves scattered by a strong wind. *i* got up from the table and lay on the bed, until three sharp knocks sounded at the door. They stood in the doorway. d'Herbinville was more imposing than ever. Behind him, her uncle looked inquisitively over his square shoulder. *i* showed them in and placed another chair at the table. There was a grey glint in d'Herbinville's blue eyes, and his jaw was set like a trap.

- Your behaviour was outrageous, said the uncle.

- Do you have anything to say, Evariste?

As d' Herbinville stepped in front of the window his shadow fell on me sitting on the bed. *i* looked up and felt my affection for him stirring once again. *i* was about to tell him she played with my emotions, even led me on, but *i* held back. What would it achieve? It couldn't alleviate this hatred *i* felt for myself. *i* knew why they were here: let fate take its course.

- What will it be? he asked. Pistols at twenty-five paces?

i nodded, almost indifferently, as though *i* were an observer in an affair that concerned somebody else. Tomorrow morning at six, said the uncle. *i* nodded again. They had already arranged everything, including seconds, weapons and a sufficiently remote spot in the Gentilly district, beside lake Glaciere. They would send a carriage for me at six in the morning, together with an appointed second. Of course, as a gentleman and a fellow Republican, *i* mustn't reveal the identity of my adversary. *i* agreed to everything they proposed. As they left *i* shook first with the uncle, then with d'Herbinville, whose hand was warm from being in his pocket. Our eyes met, pupil to pupil, circle coinciding with circle. In that instant *i* wanted to embrace him, ask his forgiveness, kiss him on the cheek, though not to avoid the duel, there was no avoiding that, but to ease his mind, for he appeared to be going through this against his will, at the uncle's instigation. In the end, however, all *i* managed was a slight nod and a promise to be ready for the carriage.

{so that $G = H + TH + T'H + \dots$ These two methods of decomposition are usually not identical. When they are identical, the decomposition is proper.}

i was awakened by footsteps in the room. A pair of grey eyes caught me in a steel trap, a grim face loomed over me, the tobacco-smelling uniform was filled by a policeman standing beside my bed. Another policeman swept the curtains aside, dazzling me. Mother was in the doorway, twisting the chain with a gold crucifix, protesting that a mistake had

been made. Brilliant sunshine filled the room, touched the poignard on the table, released a spectrum from the water in the jug, snuggled into my shoes, settled on my clothes thrown carelessly on the armchair. As the one with grey eyes read the warrant for my arrest, overwhelming me with his oniony breath, the other picked up the poignard and tested the point on his palm.

- Evariste! What have you done? cried mother.

For an instant doubt undermined my defiance, evoked not so much by mother's worried look, but by a glimpse of my left shoe with its heel worn badly on one side. As the policemen escorted me along the gritty path to the wagon, mother pleaded with me to take a small Bible. *i* didn't reply until we reached the wagon, and then *i* turned, snatched it from her and threw it in a thorny rosebush. We glared at each other for an instant, long enough for me to see my features contracted in her pupils, and to be struck by my resemblance to her.

- You'll learn respect in prison, said the policeman who had read the warrant.

They pushed me inside and bolted the door. As the wagon rumbled off, *i* could see her through the small grilled window: bent over the rosebush, picking lightly through a tangle of branches.

After the first few days in prison, my initial bitterness turned to a kind of joyful acceptance. Prison was a necessary experience in my development as a Republican, just as the wilderness had been for the prophets. Away from comforts and distractions, they strengthened their faith, purified their voices and returned to preach of a new world. Prison would be my wilderness: a place to test and prepare myself, from which *i* would emerge with a clearer vision of the Republic, a stronger voice for imparting my message.

Word of my audacious toast and threat had spread, endearing me to many of the older Republicans. *i* now belonged to a brotherhood. Heartened by their attention and acceptance of me, *i* was determined to spend time with them, speak to them, get to know as many as possible. Up to now the Republicans *i* had mixed with were mainly students and professionals, here *i* met tradesmen, workers and those from the growing class of the unemployed. These men were 'the people', the ones who had fought and won the July revolution. They were my brothers, and they would be my blood-brothers in due time. Their language was coarse, their manner abrupt. They drank in the canteen, swore and sang bawdy songs. Subduing my aversion to such things, *i* tried to be tolerant: Republicans should be judged by their actions, not their language.

- What's it to you what I done? retorted a pugnacious fellow, with a naked woman tattooed on the inside of his forearm. You one of them spies they send here from time to time?

i apologised, but the fellow winked and placed his arm over my shoulder. Extending his other arm, he flexed the muscles of his forearm: a sinew between the woman's legs twitched. The fellow laughed and tightened his grip on my shoulder. He was a Republican, *i* told myself.

d'Herbinville visited me a number of times and arranged, at his own expense, for an advocate to represent me in court. *i* appreciated his concern, was somewhat flattered by it, though not without some reservation. He was five or six years older than me, and had made a small fortune from manufacturing party crackers. He had good connections. Why was he taking such a personal interest in me? What could he possibly hope to gain?

At our first meeting, the advocate suggested we use intoxication as our defence, but *i* insisted that *i* hadn't been drunk at the time. That was our only real defence, he protested. There was a lot of wine during the celebration, people were naturally bouyant, words were said under the influence. *i* repeated that *i* wasn't drunk, that *i* couldn't bear any form of

alcohol. There was no other way, he said firmly. The incident may have been quite harmless, but the Orleanist newspapers had described it as the first threat against the new King Louis-Philippe. We had to win over the jury by appealing to their sense of compassion. He intended to portray me as a passionate, though foolish, young man who had drunk too much and spoken without thinking.

The day before the trial d'Herbinville accompanied the advocate. As we walked to the table, a swallow darted into the visiting-room through a broken window and settled in a simmering nest. Had *i* considered his strategy, the advocate asked. *i* wasn't drunk. d'Herbinville advised me to be reasonable, saying *i* would be more use to the Society outside. But the papers would spread the story that *i* had made the threat under the influence of wine. What credibility would *i* have with the students? d'Herbinville thought for a moment, then suggested that we at least qualify the threat *i* had made. There were people who would testify that they heard me say: To Louis Philippe, if he betrays. They would also swear that the qualification 'if he betrays' had been drowned by the noise.

- Perfect! exclaimed the advocate. The phrase changes the meaning and the intent.

- We're planning marches and demonstrations for Bastille Day, added d'Herbinville. We want you to lead the younger Republicans.

Unlike a month earlier, during the trial of the nineteen, the courtroom was now sombre and the balcony empty. There were no young ladies with handkerchiefs, no fierce supporters: those present appeared disinterested in the proceedings. *i* felt cheated, disappointed: this was to be my opportunity to display my Republican passion, to outdo what d'Herbinville had done a month before, but the size and mood of the gallery dispirited me. Alfred was sitting at the back, looking overawed by the courtroom's solemnity. Auguste was also present. He had visited me in prison several times, and each time urged me to concentrate on mathematics in order to overcome the harsh surroundings. *i* thanked him, but pointed out that *i* needed to mix with real patriots, that *i* felt at home amongst them, and that mathematics was a barrier between me and the Republic.

d'Herbinville sat at the front table with the advocate, whispering to him from time to time, flashing optimistic smiles at me. Listening to the advocate, to the dozen or so witnesses who testified on my behalf, *i* felt my spirits sinking. *i* had wanted to say so much, to use the stand as Cavaignac and d'Herbinville had done during their trial, but all *i* could do was stare at my tessellated shadow on the tiled floor. And ten minutes after the advocate's concluding remarks, the jury acquitted me.

{It is easy to see that when the group of an equation is not susceptible of any proper decomposition,}

Home at the end of second term, *i* was glad to get away from taunting students and the small-mined teachers who persecuted me for my passion. At last *i* could devote myself to mathematics without interruptions. Vernier had brought a few advanced problems to my attention and *i* was keen to tackle them. On the morning after my arrival, setting out for a walk through town, *i* stopped beside the study's partially open door.

- A character *i* find difficult to understand, but which appears dominated by conceit. His abilities are far beyond the average. He has neglected most of his work in class.

Father was reading from my report-book. Tobacco smoke with a hint of perfume drifted from the study.

- Works little in my subject and talks little. His ability, in which one is supposed to believe, but of which I've yet to see proof, will lead him nowhere. There's no trace of

anything but strangeness and negligence.

- Isn't there one good comment? mother asked.

- This from monsieur Vernier, his mathematics teacher. Zeal and progress very distinct.

- Mathematics?

- Seems it's the only subject that interests him.

- What are we going to do with him, Nicholas?

Mother's voice was sharp with concern, her steps were pointed on the floorboards. *i* leaned back against the wall. *i* shouldn't have been listening to their conversation, but it concerned me, and *i* might learn something that would make things a little less painful for them. She couldn't talk to me any more, she complained. *i* had become so distant. They shouldn't have sent me to Paris - father should have listened to her. That infernal place had changed me, made a stranger of me. Between the two of them, they could have supervised my education. The mayor's son educated at home? father protested. What would people have said? Besides, a good school was important for my development. Development, mother countered. *i* was going backwards. Father walked slowly across the room. When he stopped, an intermittent squeaking began. *i* recognised this at once: he was standing at the window overlooking the town square, spinning the large sphere of the earth.

- Talk to him, Nicholas, she pleaded. Find out why he's so sullen.

- Look at him, father snapped.

i sprang to attention.

- Damned Jesuits! Napoleon should have wiped them out.

- Nicholas!

i had never heard father say such things, and in that spiteful tone of voice. As the sphere squeaked, he continued to vent his anger, as though talking to himself, saying that the Jesuits were determined to win back all they had lost under Napoleon. And they would resort to anything to achieve their goal. They were going around with a kind of missionary fervour, putting the fear of the devil into people, attacking those who championed freedom and equality. He was a good priest, mother interrupted him. He had come to spread the teachings of Christ and instruct the youth in the ways of salvation. No, father insisted. He had been sent here to undermine his position. Couldn't she see it? The Jesuits wanted a conservative mayor. They wanted to take control of the boarding school. He was spreading vicious lies, saying the mayor was in league with the Freemasons, that he was corrupting the students with atheistic ideas. It was a Jesuit plot: they wanted to rule France by taking control of education.

- He's not like that, Nicholas.

- Are you also turning against me, Adelaide?

His icy tone sent a shiver down my spine. If more young people studied the Bible, mother said pointedly, there wouldn't be so much chaos and confusion. Paris wouldn't be the Babylon of Revelations. What was happening, father said in a hollow voice. Everyone was turning against him, and each day the priest's grin looked more and more like a sickle. *i* was concerned for father and angry at this new priest, but *i* didn't want to get caught up in these affairs. *i* had more important matters on my mind.

- Please, Nicholas, talk to Evariste before he returns to Paris.

- All right, all right, father sighed. As if there weren't enough to worry about!

As mother rustled toward the door, *i* tip-toed away and out by the back. It was a crisp brilliant morning. Here and there white and pink blossom pushed through the pimply branches of fruit-trees. Swallows snipped the sky with their tails, collected scraps of winter, added small domes to houses and buildings. The hills surrounding the town were covered in

green down. Splinters of light darted from mirrors in the hands of playful children. Walking toward the town square, *i* was preoccupied by one of Vernier's problems: the construction of a regular pentagon with only a compass and an unmarked straight-edge. A few weeks earlier, in the first flush of enthusiasm, hoping to match Pascal, *i* had tackled the classic problem of trisecting an angle. After a week of concentration, and moments of disconcerting lightheadedness, *i* gave up in frustration. Vernier commended me on my endeavour, and pointed out that a construction might not be possible. This grated me: it was my first encounter with an imperfection in geometry. Could the problem be solved or not? More importantly, why hadn't anyone discovered a way of determining whether or not such problems could be solved. To look at a problem and, from its external features and form, say something about its essential nature. There was something worth discovering! With the present problem, Vernier's hint that a construction was possible served at least to dispel the nagging thought that my efforts might be in vain. This problem was accessible, and *i* sensed that *i* wasn't far from a solution. Even now, passing through the market, *i* could visualise the diagram, despite the barking vendors. If the diagonal corners of a regular pentagon were connected by straight lines, the intersecting points of these lines would in turn form a smaller regular pentagon. If this were repeated, smaller and smaller pentagons would be produced, receding to the centre of the circle circumscribing the largest. And if the situation were reversed: starting from the seed of a point, countless five-petalled flowers would unfold, each a perfect replica of the preceding. There was something subtle, fundamental, in this self-generating property of the pentagon, but just as the subtlety was about to become a thought, a cabbage vendor bellowed in my ear, and everything dispersed, like a sphere of thistledown scattered by a child's thoughtlessness.

Two blue-grey pigeons were performing a courtship ritual. Puffed with expectation, the male was cooing, croaking, fanning its tail, bobbing its head in dancing around the female, which, seemingly disinterested, trotted away from these advances, arousing a wilder display of passion from him. At one point she stopped, as though about to accede to his throbbing anguish, but when he made his move she hurried away coquettishly and flew to a fountain's circular basin. Another pigeon appeared on the scene: not a common town-square type, but a fancy feather-foot, with a crest on the back of its head. It also began courting the female by throwing out its chest and throbbing riotously. Angered, the first male attacked the newcomer, pecking and flicking its wings until the feather-foot flew off to the other side of the basin. Puffed with pride, the first male started cooing around the female, but she ignored him and fluttered to the feather-foot, from where they both flapped away to the church roof. The rejected male wilted, deflated to half its size and lay sadly on the basin, as though its strength and vigour had suddenly ebbed from it.

Stupid bird! *i* said, scattering it away. Serves you right! She made a fool of you.

The town square bustled with activity. Merchants and vendors were shouting enticingly from their stalls. Women with baskets haggled over prices. Children ran around noisily. *i* tried concentrating on the pentagon problem, but the market was too distracting. There was too much disorder in human activity. Where geometry was held together by a handful of propositions and axioms, life was random, unstructured, chaotic. If *i* were an artist *i* might arrange the unrelated activities according to the dynamics of harmony, order people in groups according to the laws governing colour, juxtapose events for the sake of contrast. This was the artist's advantage: given elements a,b,c,d...he could combine and arrange them in various ways, at times producing a masterpiece. But a mathematician? What could he do with the chaos of humanity? What could he make of life? As a wine merchant extended a palm wide as a collection plate, *i* realised that mathematics and humanity were mutually

exclusive. From the sunlit steps of the church a flower vendor offered me a sprig of pink blossom.

- For luck, she winked.

Stunned, *i* stared up at a smiling gypsy. She was about twenty, with two black braids falling over her bare shoulders, and strange symbols tattooed on both forearms. She met my look directly. *i* was disconcerted by a feeling of being drawn away from myself, away from geometry, into the gypsy's dark world - a world where mathematics had no place. Flashing a smile, she asked in a sing-song voice if *i* wanted my palm read. *i* clenched my fists and ran away, past the church's dark entrance open to the morning sun.

When *i* returned home at midday, father called me into the study. *i* had spent many hours in this room before going to Paris. Mother often read to me from the classics on the shelves. The gleam of those golden titles on certain sunlit afternoons always stirred my wonder and *i* imagined that God had created light so that people could read, and through reading see other worlds. *i* now checked a swell of nostalgia. There was no time for that. Besides, those books no longer interested me. If only there had been a few mathematics books on the shelves, even one! Who knows what *i* would have achieved by now.

Father was preoccupied - the parallel furrows across his brow were deep. Standing with a slight stoop, he directed me to a chair, and then walked wearily to his desk. He sat and lit his pipe. On the wall behind him grandfather Galois stared into the distant future.

- It's been ages since our last chat, he began, turning a silver paper-knife.

Avoiding his sad eyes, *i* glanced at grandfather's portrait, in which a pistol lay on an open book. Father's feeble smile fell to a frown and he continued, saying that mathematics was good for mental discipline, but in the end it was nothing more than a refined pastime. Rhetoric! That was what *i* should be concentrating on. Words, not numbers. Study the word, he advised. Learn its secrets, use it effectively, and *i* would move hearts and create history. The revolution hadn't been won by the precise geometry of Dr. Guillotin's machine, but by the words Liberty, Fraternity, Equality. He closed his eyes and drew deeply on his pipe. The tobacco ash glowed. A protracted sigh clouded the study with aromatic smoke. Uneasy in the silence *i* watched a fly crawling over the bronze head of Marcus Aurelius - as though it were a stray thought returning to its place of origin. Drawing the blunt blade across his wrist, he asked whether politics had been interfering with my studies. *i* replied with a curt no, though *i* wanted to say more. He nodded. Yes, he knew there had been trouble at school in recent times, and that students had been expelled for defying the Director and expressing revolutionary sentiments. My generation was experiencing what he had gone through as an adolescent. He had also thought that the revolution would transform society. A new world order would be established with the fall of Louis XVI. A better, fairer world would arise from the ruins of the old order. He and his friends had adored Danton, until Robespierre persuaded them that Danton's passion went against the revolution. They supported the Reign of Terror, until others convinced them that rational Robespierre was a butcher who had to be guillotined. They worshipped Napoleon, approved a constitution that gave him unlimited power, rejoiced in his victories. They believed conquest would bring peace. But Napoleon was defeated, and suddenly they were no longer young. Middle-aged, dreams ruined, France brought to her knees before foreign powers, they watched helplessly as the monarchy was restored.

- That's politics, he smiled wryly. It promises paradise, takes your youth, and in the end fills you with bitterness. And now there's talk of another revolution, this time to overthrow King Charles. Seems the cycle's about to start again.

He got up, looked out the window for a moment, then sat in front of me, so that our

knees almost touched. Learn from the bad experiences of others, he advised me, leaning forward confidentially. Concentrate on my studies. Do well in Rhetoric. Become a lawyer. There were plenty of them on mother's side of the family. Perhaps one day *i* would become a judge like grandfather Thomas. But if *i* didn't want to become a lawyer, he wished that *i* would one day run the boarding school, which had been a good source of income for the family. But things were changing daily, he said, rubbing his eyes. There was no certainty any more. His political enemies had joined with the new priest and they were doing their utmost to undermine not only his position as mayor, but his running of the school.

- Don't add to my problems, Evariste. Help me by helping yourself. If you're involved with a political group at school, please break away from it now, before it's too late.

He had never spoken like this before. What was happening to him? Who were his enemies? They had frightened him to the point where he was now renouncing everything that had once been so dear to him. His words moved me, the sadness in his eyes alarmed me. *i* wanted to allay his concerns. No, *i* wasn't involved with any political group. *i* had other interests. And mathematics, he asked. Would *i* curb my enthusiasm for the subject? *i* stood without replying, eager to leave the study before my emotions were further agitated. How could *i* concentrate on geometry if *i* were drawn into the family's problems?

- Don't throw away your youth on empty promises, son.

Embracing me, he whispered in my ear that there was no better world.

{then, no matter how the equation is transformed, the groups of the transformed equation will always have the same number of permutations.}

Al jabr w'al muqabala.

Vernier wrote the strange words on the blackboard, then read them aloud several times, stressing each syllable. Sunlight streamed through the grilled windows, cast a skewed grid on the board, revealed chalk-dust falling from the letters, like dandruff from a scalp scratched in perplexity. It was Arabic, he announced. It meant restoration and reduction, give and take, to have and have not. We would begin our study of algebra with those three syllables. *i* listened with a sense of expectation, my passion for mathematics undiminished even though *i* had been unable to solve all the problems he had set for the term break. Father's plea for me to consider a career in Law receded in the presence of those mysterious syllables. *i* sat forward and hung on every word. Algebra hadn't existed in Classical Greece, he pointed out, walking from side to side, now and then stopping in a prism of light extending down from a small window high up in the side wall. Even by Euclid's time problems were still solved geometrically. The study was firmly established by Diophantus, rightly called the Father of Algebra, who'd lived in Alexandria around 270 A.D. Little was known about him, except for what had been inscribed on his tomb: his boyhood lasted one-sixth of his life, his beard grew after one-twelfth more, and after one-seventh more he married. Five years later a son was born, who lived to half his father's age. He died four years after the death of his son. Vernier paused, read the epitaph again, and instructed us to write it in our books. How long had Diophantus lived? Waiting for an answer, he removed the glove from his left hand and examined the webbing between his fingers.

- Well, gentlemen?

Eyes magnified by the thick lenses, he scanned the room, then directed an expectant look at me. My first reaction was to call out the answer, but *i* shrugged my shoulders and looked down into the inkpot. *i* had never been one to volunteer an answer, and *i* wasn't going

to start now, even though *i* didn't mind Vernier.

- Not even a guess?

He leaned on the window sill, hair glistening in the spring sun, his shadow on the blackboard. Given only the shadow could one reconstruct its object? Different lengths of straight line all projected a point, so given only the point how was one to determine the line's length? The possibilities were infinite. And physical objects? Were they projections of thoughts? Ideas? The Creator's will? What projected this iridescent quill?

- Some of you may find the answer by trial and error. If you can't, don't lose heart: once you've mastered the essentials of algebra you'll solve the problem in a few lines.

He removed his other glove and placed both on the table - a sign that there would be no more note-taking for the remainder of the lesson. A few students closed their books and settled into more comfortable positions. Pacing the platform, face glowing with intensity, he continued in an even, melodious voice. After Diophantus algebra fell into oblivion for a thousand years, until it was rediscovered in the West through translations of Arabic texts, in particular the works of al-Khwarizmi. The subject made slow but steady progress during the Renaissance, mainly in the form of reinterpretation of what the Greeks had known. Matters changed rapidly with Descartes, who combined geometry and algebra, and from this unlikely union mathematics made spectacular advances. He pointed upward with an inflamed finger.

- Mark this well, gentlemen. Before Descartes' discovery geometry was inextricably bound to the physical world, despite its elevated nature. No matter what Plato said about ideal forms, the compass was still needed to represent a circle. Algebra changed all that: it liberated the mind from attachment to things.

i wanted to shut them up. Fools! Stirring and shuffling! They didn't understand a thing. But Vernier went on, his voice almost lyrical despite their restlessness. Because of Descartes, the circle had parted company with the compass: it passed from the domain of the senses to the range of the intellect. Through the sublime language of algebra the circle had been translated and restored to its rightful place: the ideal - the realm Plato could only dream of. Vernier stopped for a moment and spread his arms wide as though to embrace the entire class.

- Geometry has had its day, gentlemen, he declared. It's been a magnificent edifice for two thousand years, just like the Parthenon, which is the very embodiment of geometry. Since the time of Descartes, geometry has been losing ground to algebra, and *i* venture to predict that in fifty or hundred years Euclid will no longer be taught in schools.

A murmur of complaint rose from a few students. Why had they spent an entire term on a subject that was not only useless but which would soon be obsolete? Fools! They hadn't grasped the essence of geometry - it was an exercise in pure thought. Ignoring the protests, Vernier continued. Algebra would not only be the means to the future, but it would enable us to recover the past. The unsolved problems of geometry, the trisection of an angle - all that would be done through the magical x . Algebra had rightly been considered somewhat mystically. Ahmes, the Egyptian, writing more than three thousand years ago, had said it was the means of knowing all that exists, of solving the mystery of man, and unlocking the secrets of the universe. In concluding, Vernier raised both arms and, almost exultantly, intoned that if, as the ancients claimed, geometry made us human, then algebra would make us divine. As the bell rattled over his last words, the students sprang from their seats and scrambled out.

- Galois, he called over the commotion.

i gathered my things and went to the front, concealing my pleasure at being detained. He sat with a deep sigh, placed his hands behind his head, and stared at the ceiling.

- Savages, he grimaced. *i* don't know why *i* bother.

He leaned forward, examined the dermatitis between his fingers, then accorded me a wistful look. Dreams - enjoy them while *i* could, he advised, before they turned to chalk-dust. Yes, he had also been good at mathematics at my age, and dreamt of making discoveries, becoming a professor at the Polytechnic. But youth's promise proved a lie. At eighteen he accepted his abilities and reconciled himself to a career in teaching. At first, full of high ideals, he had been determined to enthuse his students, make his subject interesting, relevant, alive. He would be a real teacher, just as Pythagoras had been to his disciples, as Socrates to Plato, Aristotle to Alexander. But his idealism hadn't lasted long: it faded after the first few years, worn out by unruly students whose minds were on revolution and promiscuity. *i* listened with head bowed, unsure of what to say. Occasionally, he continued, he came across students with a real talent for mathematics, students who revived his idealism, and for whose sake he tried to summon what little of his enthusiasm remained. *i* was such a student. But what would become of me? Would my aptitude prove longer lasting than his? He hoped so, as much for my sake as his own. He had been teaching for eleven years now, and he would probably teach for another thirty. A lifetime of bells, bored students, the same notes turning more yellow and tattered each year.

- Develop your dream, Galois. Become a mathematician, discover a great theorem, get a position at the Polytechnic. But you must work methodically, lay good foundations, and, above all, express yourself clearly. Unlike geometry which relies on a diagram, algebra has no objective reference: it's an abstract language which requires great precision.

Removing his glasses, he raised them to the light. Sensing another long-winded lecture, *i* picked at a thread on the spine of my book. He sighed on each lens, rubbed them with a piece of green felt, and asked about the problems he had set for me during the vacation. *i* had spent a lot of time on them, without finding a solution. Frustrated, the thought had often occurred that *i* was perhaps wasting my time on impossibilities. Thinking about mathematics, even about problems that had no solutions, could never be a waste of time, he countered, with real conviction. Like prayer and meditation, it raised the spirit from wasteful passions, material pursuits and the present political madness. He would rather devote a lifetime to a problem that proved insoluble, than be drawn into the chaos of life without mathematics. He had been about my age when he tried to prove Fermat's Theorem, considered the Gordian knot of pure mathematics. A place in history awaited the person who could unravel it. Fermat had written his theorem in the margin of Diophantus' text on equations, and beneath it added that he had a proof, but that the margin wasn't wide enough to accommodate it. That margin had become the most famous in history: a few centimetres of blank space had exhausted a sea of ink, produced a mountains of scripts. Sometimes he imagined Fermat peeping from behind his theorem, smiling mischievously in the knowledge that he had perpetrated a hoax which would tease and torment countless minds. And even if that were his intention, he would still rather follow Fermat than sink into the cesspit of politics and promiscuity.

As with geometry, *i* wanted to plunge into algebra. *i* would devote my life to this sublime language, unlock some of the universe's secrets. *i* couldn't wait to tackle Fermat's Last Theorem. Glancing up at Vernier, *i* was suddenly sorry for him: for the inflamed webbing between his fingers, the chalk-dust on his elbows, the drop of dried blood on his chin. No! *i* wouldn't end up like him. Better to beg on the streets and remain true to the spirit of mathematics, than teach a class of disinterested students for the sake of a comfortable life.

- Have you read the book *i* gave you? he asked, securing his glasses around his ears crimson in the sunlight.

i slipped out a thin volume pressed between two others and placed it on the table. *The*

Golden Verses of Pythagoras, by Fabre d'Olivet. He had given it to me before the break, with the rather cryptic instruction to read it in private, adding that it wasn't meant for everyone, but for the few who truly appreciated the spiritual nature of mathematics.

- What do you think of it?

i hadn't understood it all, but *i* saw Pythagoras as a prophet, his brotherhood as a monastic order with strict vows, and mathematics as a kind of religion. *i* would feel at home in a brotherhood that lived exclusively for mathematics. As he leaned forward, *i* saw my faint reflection in both lenses. This wasn't an age for books of this sort, he said, lowering his voice. Mysticism was under attack from all sides. Napoleon had hounded d'Olivet, and now the Church condemned his work. The unenlightened failed to see that mathematics was spiritual by nature. He warned me not to be seduced by this secular age. The proponents of industrial progress would have us believe that knowledge should be useful and lead to material prosperity. If mathematics was my calling, and he firmly believed it to be, *i* should endeavour to leaven my work with a little spirituality. Could he recommend a few texts on algebra that might be in the school library? Without hesitation he referred me to three, all by Lagrange: *Resolution of Algebraic Equations*, *Theory of Analytic Functions*, *Lessons on the Calculus of Functions*.

{On the other hand, when the group of an equation admits a proper decomposition, in which it has been separated into M groups of N permutations, then we can solve the given equation by means of two equations,}

Clothes! Bought and sold! Clothes! Bought and sold! A woman's doleful voice rose from the street outside the sanatorium. Her cart rattled over the cobbles. Twilight consumed the afternoon, filled my room, covered me in crimson as *i* lay on the bed. *i* still had my Artillery uniform. Why not sell it to her? Auguste could pass the money on to mother, to help pay for my burial. Or *i* could give it to d'Herbinville, who paid for the uniform in the first place. It would be no good to anyone bloodstained, with a bullet hole in the chest. *i* might as well salvage something from this mess. In the four days since writing to Auguste my anger and hatred had ebbed away, self-loathing had turned to resignation. d'Herbinville was a good marksman, he wouldn't miss from twenty-five paces. The appointed seconds would come, fresh-faced from the crisp morning, and explain the protocol in a pleasant manner. We would make conversation in the carriage. Discuss the recent death from cholera of Chief Minister Perier, and how the Republican cause would benefit from it. They might even offer me a dry fig or a sweet. And the carriage would clatter to Gentilly: through the grey dawn, away from the city, between green wheat fields spotted with poppies, to the misty silence of the pine grove. There, no matter how *i* arranged and re-arranged the scene of the duel, no matter how *i* grouped the given elements, how *i* positioned the characters relative to the sun splintering through the pines, no matter whether a cuckoo counted to six or eight, no matter which permutation *i* considered, the outcome was always the same: d'Herbinville found his mark.

{one having a group of M permutations, the other N .}

Taking up residence in father's apartment in Paris, *i* was free to devote all my time and energy to the Republic. One evening, as *i* set out to a meeting of the Society of the Friends of the People, my spirit soared above the fog thickened by smoke, fouled by vapours rising from sewers. Cavaignac was already addressing the gathering, urging members to join

the Artillery of the National Guard. He pointed out that the Artillery consisted of four battalions, of which the second and third had a Republican majority. To protect their interests by controlling the National Guard, the Royalists had precluded the poor from enlisting by imposing a 250 franc levy for the cost of uniform and equipment. The Society had to control the Artillery if it was to have any real power. He urged people to remember that the trial of King Charles' ministers was set for the twenty-first. The people demanded their heads, while the new King Louis Philippe insisted they should be imprisoned for life. It was a situation made for another revolution. With numbers in the Artillery, the Society would lead the people forward, overthrow the monarchy and declare a Republic.

Unable to see proceedings from the back, *i* squeezed through to the front as the next speaker took the platform. An officer in the Artillery, Pecheux d'Herbinville wore a blue coat with red epaulettes, red-striped trousers, and black boots. *i* listened intently, taken in by the speaker's radiant face, his bright blue eyes, his imposing stature. He gave details of how one could join the Artillery, and followed this with a list of duties, which included drilling twice a week from six to ten in the morning in front of the Louvre, and practising shooting once a week at Vincennes. As his strong voice resounded in the hall, *i* suddenly wanted to meet him, shake his hand, look into his eyes and declare my readiness to enlist. *i* had never experienced this before: a feeling of admiration mingled with excitement and apprehension. As *i* pushed through to the platform, my heart pounded, my stomach tightened to a knot. *i* introduced myself and announced that *i* was ready to enlist, barely able to say the words. Shaking hands, mine wilted in his grip.

- How old are you, Galois?

- Nineteen.

He congratulated me and provided a few more details. *i* looked down bashfully from his steady gaze to his shining boots. And the money for the uniform? His smile was like a beacon. *i* assured him *i* would get it. His blue eyes held me firmly for a moment, and then he asked me for my first name. My voice cracked on the second syllable. The Republic needed my enthusiasm, he said, tapping me on the shoulder. *i* wanted to reply, say something, but my heart was racing, and *i* was pushed aside by the next volunteer.

Outside the fog had condensed to a drizzle that drifted across the city. Elms black from dampness lined the boulevard. *i* tried to gather my thoughts, account for my confusion. Was it due to excitement? The fact that *i* would soon be wearing a uniform? While at the Preparatory School *i* had always been envious of students at the Polytechnic: they wore a military-type uniform, while we dressed as we liked. This, and maybe a sense of belonging to an identifiable group, might have accounted for some of my excitement. But there was something else, something about d'Herbinville himself. Was it his bearing? His heroic stature? The thought of serving under him? *i* walked briskly, determined to get the 250 francs.

{When therefore we have exhausted in the group of an equation
all the possible}

A violent cough shakes me, almost bursts my lungs. Unable to smother it, *i* get up and lean on the table until it passes. Her father has assured me it's not consumption. A pity. It would have been a good way to go. How ironical! It could have come from a novel! Released on parole from a stinking prison, brought here to recuperate, fell in love - and death by a bullet. Who knows, *i* might have been better off serving the full sentence. Just before my release *i* was haunted by Ogin's prophecy and his death. My health had deteriorated and *i* was convulsed by a violent cough. It was the dead of winter. *i* couldn't get Ogin's words out of my

head. *i* became alarmed whenever a chill passed through me, or when my fingers and toes went numb, or when *i* woke from murky dreams short of breath and damp with sweat, or when a gaunt figure with hollow sockets looked at me from a mirror. My fear grew when the word cholera was whispered. *i* knew it was more than a rumour when the authorities increased the quantity and quality of food, and when they distributed warmer clothing and blankets. My health declined rapidly. *i* didn't have the strength to get out of bed. One day Respail bowed over me. The March sun gleamed from the rims of his spectacles. *i* would be leaving prison the following day, he said. He had warned the superintendent that there would be a riot if anything happened to me. d'Herbinville had arranged for my transfer to a sanatorium on the Rue l'Oursine. *i* would be free to come and go as *i* pleased. *i* shouldn't lose heart. Spring would breathe new life into my frail body.

{proper decompositions, we shall arrive at groups which can be transformed, but whose permutations will always be the same in number.}

Mother prodded the fire firmly. First there was father's death, then my expulsion from school, now this! No, she said, striking the poker on the grate. She wouldn't support me any longer. She had been forced to sell the boarding school. *i* would have to find work since *i* refused to study. Uncle had offered to find me a place as a private tutor, or a position as a legal copyist - my handwriting was good when *i* concentrated.

- Please, Evariste, help me.
- *i* need the money!
- Haven't you heard what I've just said?
- My life depends on it.
- I haven't got it. And even if I had...

d'Herbinville's image flitted in the flames. If she gave me half of next year's allowance, *i* wouldn't ask for another sou. *i* promised. *i* would even sign a note disclaiming my inheritance. She would never have to concern herself with me again. *i* would have a home in the Artillery. *i* might even become an officer. It was my last chance. *i* wanted to make something of myself. No! She hung the poker on its stand, clapped her sooty hands and left me with the churning fire.

{If each of these groups has a prime number of permutations, the equation will be solvable by radicals, otherwise it will not be solvable.}

i finished Lagrange's books in a few days, all three of them. At times *i* was so excited, *i* had to put them aside in order to subdue a tremor that made reading impossible. *i* had never read like that before: more than just intense reading, each page was an experience, a remembrance, a reacquaintance with things long known. *i* grasped the abstract language of algebra effortlessly, as though it were a scent or a melody. Had anyone ever read like that? A reading where the reader and the text became one. A few students were immersed in translations of Walter Scott's adventure novels: caught up in another world, they read voraciously, identifying with the heroes. But my reading was more than identification: it was the act of becoming the text, the very symbols of algebra.

Having spent an entire Sunday on Fermat's Last Theorem, *i* now tossed fitfully in bed, unable to sleep - x , y , and z swirling in my head like autumn leaves. When *i* finally lapsed

into a drowsy state, *i* heard my own voice calling from a distance.

- *i* am mathematics. *i* am mathematics.

i sprang up, terrified that *i* had become disembodied thought, that *i* would disintegrate into a chaos of symbols, numerals, pronominals. Steadying myself on the bed-head, *i* repeated my name and my date of birth and that *i* was a student at Louis-le-Grand. The anxiety gradually abated, my heart stopped galloping. The following morning fever burned my forehead, an ache chiselled between my eyes. Confined to bed for the day, *i* flicked through Lagrange's text on equations. Excitement alternated with torpor, lucidity with murkiness. As warm sunlight filled the dormitory and doves crooned to each other, *i* lay the text on my chest and succumbed to a languor, a drowsiness that loosened my sinews and carried me off to the front steps of the church in Bourg-la-Reine. The gypsy drew me with a smile. Father was talking to the priest in the steeple's sharp shadow. *i* offered the gypsy my hand. Dropping a few poppies on the step, she opened my palm and studied it for a moment. What were those symbols on her forearms? *i* couldn't make out a thing. She drew me up the steps, toward the nave's dark entrance. *i* glanced at father: he was now arguing with the priest, who swayed a gold watch on the end of a chain. *i* pulled away, but she held firmly and led me into the cool nave where she began undressing. Her body was covered in mathematical symbols. She opened her arms. *i* wanted to leave, but *i* also wanted to get closer, to read the symbols. An equation was tattooed above her breasts. It looked simple enough, but *i* couldn't solve it. What was happening to me?

- I am the solution, she laughed.

i was wakened by Lagrange's text falling to the floor with a thump. My hair was damp with perspiration. As the door-handle squeaked, *i* feigned sleep. *i* didn't want to confront Laborie, the school's director. *i* had been informed of his intended visit by the janitor who acted both as nurse and food-bearer. Shoes, several pairs, scraped the floorboards, approached in stops and starts. Had Laborie brought a panel of teachers with him? Were they going to interrogate me? Threaten to tell father of my poor progress? Advise me to subdue my passion for mathematics, not only to avoid outright failure, but for the sake of my health? A web of whispers surrounded the bed.

- Galois? Are you asleep?

Four students were standing above me, all looking very serious. Political activists, they had approached me several times about joining their group. Their aim was to continue the work of the students who had been expelled, and to keep the ideals of the Revolution alive. *i* made it clear that *i* wasn't interested in their cause. Two on each side of the bed, they leaned over me, grim with determination. The school's freedom was at stake, said the tallest, spraying his words. Reaching down between the two on my right, *i* picked up the text and placed it on my chest. They exchanged looks.

- Six, *i* remarked.

- What's that supposed to mean?

- The number of ways four people can look into each other's pupils.

Robespierre had been a student here, said the tallest. We had to follow his example. The conservatives would turn the place into a seminary if we didn't defend our rights. *i* wasn't interested in Robespierre. There was more heroism and nobility in a hair from Archimedes than in all their revolutionary heads put together.

- You're too smart for your own good, Galois!

- People with brains aren't demoted.

- You're nothing but a silverfish crawling between the pages of that book.

i threw the text at the tallest: it brushed his face and crashed against the window,

startling a pair of doves. The others restrained him from springing at me. He spat some abuse and they left. Alone again, *i* reproved myself for having allowed them to upset me. *i* should have dismissed them by calmly reading my book, instead of acting like a fool. *i* recalled the wisdom in *The Golden Verses of Pythagoras*: control emotions with enlightened reason, bear ridicule in silence. The novices practiced restraint in order to enter the mathematical fraternity. My behaviour had been childish, not in keeping with one aspiring to enter the sacred temple. From now on *i* would bridle my heart, avoid others even more assiduously. Solitude: that was the golden rule. Silence: that was the source of mathematics. Going to the window, *i* felt lightheaded, unsteady. The impact had cracked the book's spine: its covers were bent back like the wings of a dead bird. *i* brushed away the dust, pressed the book to my chest with crossed arms, and gazed beyond the walls surrounding the school.

{The least number of permutations which an indecomposable group can have, when this number is not a prime, is 5.4.3.}

Impressed by my understanding of Lagrange, Vernier allowed me to follow my own inclinations, occasionally commenting on my poor presentation or hasty conclusions, and even then tactful in what he said, as though mindful of my reputation for being irascible. *i* was already solving difficult problems when he began the topic of equations. There was little he could teach me about theory and application, but *i* liked his historical introduction to a new topic and those anecdotes drawn from the lives of mathematicians. The others were inattentive, but *i* sat up and listened as he, face flushed, perspiration glistening on his upper lip, strained to make himself heard over the noise. The Egyptians had been able to solve equations in one unknown, but their method was tedious by our standard. They considered a linear equation such as $2x + 5 = 13$ difficult. Of course, they didn't use the decimal system of counting, nor did they express the problem in that form, and that was precisely the reason for their difficulty. Without x , that great liberator, they couldn't state the answer as a simple arithmetical combination of the digits 2, 5, 13. Quadratic equations like $2x^2 + 11x + 5 = 0$ were solved in various ways by the Egyptians, Greeks, Hindus, Arabs and Chinese. A formula for the solution of the general quadratic contained the four arithmetical operations and the extraction of a square root. In fact, this solution involves reducing the quadratic to two simple linear equations. Particular cubic equations like $2x^3 + 13x^2 + 16x + 5 = 0$ were solved by the Greeks, but a formula for the general solution wasn't discovered until the 16th century. Again the solution involved reducing the cubic to a quadratic and a linear equation.

Scratching vigorously at the webbing between his thumb and forefinger, he glared at a student who was encouraging others to join a demonstration in the courtyard of the Palais-Royal.

The background to the solution of the cubic was a story in itself, he continued. The intense rivalry and intrigue between the people involved would make a fascinating novel. There was precious little mathematics in our literature: aspiring writers among us would do well to keep this story in mind. The formula for the solution of the general cubic had arisen from the solution of particular types of cubic. Early in the 16th century Scipione del Ferro, a professor of mathematics at the university of Bologna, discovered the solution of cubics of the form $x^3 + ax = b$, which he passed on to his pupil Antonio Florido under a vow of secrecy. In Italy at that time mathematical contests had been as popular and lucrative as chess tournaments of today. Florido, thinking to use the secret for financial gain, contested with the great Nicolo Tartaglia, a self-taught mathematician, whose real name was Fontana, but was

called Tartaglia, which meant stammerer, because he had been slashed across the mouth by a sword as a child. It appeared Tartaglia knew, perhaps through Florido's inability to keep his secret, that his opponent would set problems of the sort $x^3 + ax = b$, so he spent weeks seeking the solution, for he was certain that Florido couldn't solve cubics of the form $x^3 + ax^2 = b$, whose solution only he knew. Solving the problem on the evening before the contest, Tartaglia got the better of his opponent and collected a good deal of money. Guarding his solution, Tartaglia refused to publish it, no doubt banking on other contests and more prize money. However, Girolamo Cardano appeared on the scene and implored him for the solution. Tartaglia relented. Pledging Cardano to secrecy, he revealed the solution in a twenty five line cryptic poem, which he later followed with a full explanation. How had Cardano managed to extract the solution? Some scholars maintained he threatened to kill Tartaglia, which wasn't that far fetched, for Cardano was a violent man, who had not only severed his son's ear in a domestic quarrel, but was rumoured to have murdered someone. Acknowledging that he had received only a small hint from Tartaglia, Cardano published the solution of the cubic in his famous *Ars Magna*. Seething with anger, Tartaglia challenged Cardano to a mathematical duel in a church in Milan. On the day, however, Cardano failed to show, sending instead his student Lodovico Ferrari. The affair ended in a brawl and Tartaglia claimed he was lucky to escape alive. Whose story should we accept? It appeared history had gone against Cardano, and little wonder when one considered his personality. A professor of science at the university of Milan it seemed he divided his days between mechanics and mathematics, and devoted his nights to astronomy and debauchery. He was imprisoned for the heretical act of publishing Christ's horoscope. It was said that astrology was his downfall: having calculated his own horoscope, in which he had foretold the date of his death, he felt compelled to take his own life when the day arrived, in order to preserve his reputation.

The story intrigued me. Was Cardano right in breaking his promise? But what right did Tartaglia have to withhold a piece of knowledge that would advance mathematics? As he was self-taught, perhaps from a poor background, and possibly unable to obtain a professorship because of that speech defect, those mathematical contests may have been his only means of livelihood. No, there was no justification for Tartaglia's secrecy. A copyright couldn't be placed on mathematics - it belonged to the world. Cardano did well to break his vow. What would have happened if Tartaglia had died, taking his important findings to the grave? Mathematics would have been set back years.

Darting threatening looks here and there, Vernier was now struggling to make himself heard. The veins in his neck seemed as if they would burst. After the cubic, interest had naturally turned to the quartic, or biquadratic. A certain Colla, or Coi, proposed a problem which was translated to $x^4 + 6x^2 + 36 = 60x$. Unsuccessful in his attempts to solve this equation, Cardano passed it on to Ferrari, who solved it by substitution and reduction to a cubic. Cardano, in his *Ars Magna*, credited Ferrari with the solution, adding that his pupil had made the discovery at his request.

Vernier slammed a heavy book on the front desk. An inkpot fell to the floor, staining his shoes. The commotion subsided, and he proceeded to tell us about the quintic - the general equation to the power of five. The ablest mathematicians had attempted to find its solution, without success. Euler and Lagrange tried reducing it to a quartic, but ended up with an equation of the sixth degree instead. And that was where matters stood at the moment. The general quintic remained unsolved. Some maintained it couldn't be solved by arithmetic and the extraction of roots. Recently, Ruffini, another Italian, thought he had proved that it couldn't be solved, but his argument was shown to be flawed.

- So, gentlemen, the challenge is before you. Honour, position, immortality awaits the person who's able to find the quintic's solution or prove that it doesn't have one.

Hardly able to contain my excitement, *i* wanted to tell Vernier and the class that *i* had read about the quintic in Lagrange's book, and had been looking for a point of entry into the problem. But would this rabble understand? The two behind me were whispering about a brothel. Others were discussing the Republican cause. Would any of them understand that the struggle with the quintic was more heroic than the struggle against oppression? It was easy to die for political causes - countless had died, instinctively, without a second thought. But how many could devote their lives to a struggle with an abstraction? Risk having one's mind shattered for what might prove an impossibility? Sacrifice everything for an equation?

{ 2^0 . The simplest decompositions are those which occur in the method of M. Gauss.}

A deletion in the margin reminds me that halfway through writing this document, *i* got up and walked around the room for a moment. The Artillery uniform was on the bed. It had a musty smell, the epaulets had faded and the buttons had lost their shine. *i* hadn't worn it since my arrest - more than ten months ago. The prison authorities returned it when they transferred me here. *i* admired it for a while, then smoothed out the creases with my hands. *i* had never worn it fighting for a Republic. There had been talk of another revolution, bigger, more decisive than the one in July, but it never eventuated. *i* might as well wear it to the duel, *i* thought. It would be a battle of sorts, even though between fellow Republicans. *i* had lost weight in prison: the jacket was loose, the shoulders drooped. The mirror on the table reflected a comical figure. d'Herbinville would smile ironically when he saw me in it. How long before they came for me? Writing, immersed in mathematics, *i* had lost all track of time. At the last toll had the clock struck once or twice. At least another three hours. *i* had to hurry, or they would find me still writing. But was there enough oil in the lamp?

{As these decompositions are obvious, even in the actual form of the group of the equation, it is useless to spend time on this matter.}

A week after my arrest on the Pont Neuf, and still the authorities hadn't charged me with anything. A preventative measure, that was all they said. Unlike the month *i* had spent in prison over the threat to Louis Philippe, during which *i* saw imprisonment as a preparation for greater Republican involvement, the days now weighed heavily on me. *i* became silent, and avoided the other prisoners. Duchatelet, a law student who had also been arrested with me, explained the legal situation: the authorities wanted a conviction, and for this they needed a charge that would warrant a trial by judge, not jury, which would more than likely be sympathetic, as it had been in my previous trial.

Pacing the courtyard one afternoon, *i* glanced at Ogin and his little disciples. Hopelessness invaded my thoughts, seeped into my being like a dark vapour. That previous spell in prison had been different: on that occasion *i* still had a vision of my place in the Republic, there was still a glimmer of hope that the Academy would recognise my mathematical discoveries. But Poisson's harsh rejection had killed that hope and darkened everything. And now laughter roared from the canteen's window.

- Thinks he's too good for us!
- We don't need high-brow patriots!

- A friend of the people drinks with the people!

These were the very prisoners whose company *i* had welcomed not so long ago. Now, just because *i* wanted to be alone, they turned on me with savage sarcasm.

- Don't take any notice of them.

Respail tapped me on the shoulder. Arrested a few weeks before me, he had been charged with publishing provocative pamphlets. In his mid-thirties, with a soft voice and a jagged Adam's apple, he took me by the arm and led me to a bench in the shade.

- That canteen's nothing but trouble, he said.

- They're animals, Francois.

- Don't lose sight of the Republic.

- They don't deserve one.

Respail rebuked me mildly. Had *i* forgotten the oath *i* had taken upon joining the Society? Who do *i* think the people were? Mathematicians and scientists, like us? No! Those prisoners up there were the people, not the ideal, abstract notion *i* imagined. *i* had to be more accommodating. Make my heart a Republic first, then fight to make France a Republic. *i* shouldn't be so aloof. They taunted me because *i* was too serious. Get closer to them, speak to them, learn from them.

- They can't teach me a thing! *i* said defiantly.

After some coaxing, he persuaded me to go with him to the canteen for a game of chess. The place was like a restaurant, providing everything from caviar to coffee, from spirits to sweets. The prisoners who taunted me looked up from their card game, winking and snickering. We sat at a table beside a window overlooking the courtyard. His disciples gone, the shaggy haired, barefooted Ogin was limping in a strip of shade, deep in thought.

We hadn't made four or five moves when an a woman entered the canteen, embracing a pair of knee-high riding boots. The prisoners became excited. The canteen-keeper greeted her with a kiss.

- Right on time, chuckled an old fellow, looking up from sweeping the floor. Hugging your lovely twins as usual. Them boots might be thin-soled, but they'd fill the devil himself with spirit.

The canteen-keeper took the boots, placed them on the counter, and, as though performing a magic trick, started pulling out bottles of brandy. At each bottle the prisoners shouted for more. Plunging his arm shoulder-deep in leather, the keeper pulled out the last bottle and returned the boots to the woman, who went behind the counter and filled them with empty bottles. She then kissed the keeper and left. The prisoners bought several bottles and returned to their tables.

- A toast to the Republic! announced a swarthy man.

Invited to join them, the old sweeper shuffled to an extended glass.

- And you, patriots? asked the swarthy one.

i stared fixedly at my black bishop. Respail scraped back his chair and went for a glass.

- Are you a patriot or not? prodded the toast-maker.

- More than you'll ever be! *i* retorted.

- What's that? he snarled.

- Forget him, the others shouted. Make the toast.

- To the Republic!

i leapt to my feet, swept the chess pieces off the board, and ran off to the courtyard. Ogin was still there, sitting in a patch of cobbled shade, arms around his legs, head on his knees. *i* stopped beside the flagpole. It had been recently painted white, and its shadow cut

across the yard. The tricolour would soon be brought out for the evening flag-raising ceremony, when the prisoners gathered in the courtyard and sang the Marseillaise in solemn tones, and the children followed with their own patriotic verses. It was always a moving moment, and everyone was transformed, elevated. Why weren't they always like that? How could they be so idealistic on one occasion, so crude on another?

- What's he doing? one of them shouted from the window.

i remained fixed to the spot, my back to them.

- Leave him alone, said Respail.

- You'll never think the Republic into being!

- It lies in a glass of brandy.

- In a whore's eyes.

- Enough, Respail interjected.

And then the swarthy one called out from the window, asking what had *i* done for the Republic. What had *i* sacrificed? The authorities couldn't find a charge to pin on me, he laughed. *i* would probably be out in a week. He could've been a writer, another Hugo or Dumas. But he had used his talents for nobler things. *i* write and printed pamphlets for the workers, not porridge for the bourgeois. But he had been tracked down, his presses were smashed, and he was given three years for subversion. Did *i* hear that? Three years!

i tried to ignore them, first by concentrating on my shadow, then by repeating over and over one of the theorems in my last memoir: an irreducible equation of prime degree was solvable by radicals if all its roots are rational functions of any two of them, and this was a necessary and sufficient condition.

- The Republic needs men!

The last taunt was like a barb. *i* ran past Ogin, who didn't look up from reading the lines on his palm, and bounded up the stairs. Animals, *i* shouted, bursting into the canteen. Two of them threw aside their chairs. Respail rushed from the window and restrained me. *i* spat my words at them. Republic! They didn't deserve one! A true Republican had the soul of Archimedes! Had they heard of him? He gave his life for a circle! Only those prepared to die for an idea were worthy of the Republic.

- Who's been drinking, him or us?

- It's easy to be brave after a bottle of brandy! *i* shouted.

- Take a drink if it's so easy.

- Prove you're a man.

Breaking away from Respail, *i* snatched the bottle from the swarthy one and took a long drink. The others chanted: More! More! Respail pulled the bottle away from me. Tears in my eyes, *i* shouted that *i* would drink it all, and grabbed the bottle from Respail. *i* drank again, and threw it at the swarthy one, who managed a sidestep. Respail caught me in an embrace. My chest was burning, my stomach was on fire. The canteen was swaying, breaking apart. *i* thrashed violently in Respail's arms, screaming insults and abuse, raving about the Republic and mathematics. The ceiling was collapsing, the floor was giving way. My legs buckled. The old sweeper propped me up from one side, Respail from the other, and they dragged me out. My shoes scraped the floorboards, the stairs, the cobbles. *i* babbled and sobbed all the way to my cell.

Weeks later Respail told me what *i* had said and done in my delirium. Dear Francois, *i* mumbled to him, crying like a child. You're a true Republican, infinitely better than me. You never get drunk. You're always high-minded and a real friend of the poor. *i* like you, Francois - now more than ever. What's happening to me, my friend? There are two opposing forces within my puny body: one's for order, the other for destruction. And *i* know which is

going to win out in the end. i'm too impatient, too excitable. *i* loathe alcohol, but at a word from those animals *i* drank a whole bottle. *i* don't like women, but *i* will probably die in a duel because of some flirt. Why, *i* howled? Why? And then *i* leapt from the bed, screaming: The stairs! That's where my salvation lies! But they caught me before *i* got there. *i* writhed and kicked with a force that surprised Respail. He held me down by the shoulders until my body slackened, and once again *i* poured out my feelings to him. What do *i* lack, Francois? *i* will tell you, my friend. More than mathematics, more than the Republic, *i* need someone to love. Can you understand that? *i* loved my father, Francois. But he's dead, and nobody's filled the vacuum he left in my being. Laugh, Francois! *i* am a miserable creature. But you're not like the others. You're a doctor, you know all about suffering. What a filthy hole we're in. *i* want to get out. *i* sprang up again, shaking, grasping Respail's arms. *i* will love again, *i* sobbed. Someone will fill the vacuum left by father. And then *i* will be happy and find the peace of mind to work on my mathematics. It will be a pure love, Francois. Love without...you understand. Purity, Francois. What *i* have sought all my life. Mathematics without matter, a Republic without possessions, love without flesh. It's possible, Francois. Purity, like the angelic voices of the Castrati. Why not? The body's the source of all that's base and vile. Oh, father, father. Tearing myself from Respail's grip, *i* snatched a pair of scissors left on a chair by a prisoner who had been cutting his toe nails. A few others scrambled to assist Respail. Let me go, *i* cried. They twisted the scissors from my fist raised in the air. Look, *i* raved. A cross, an *X*, salvation. The scissors fell. *i* retched and spewed on the bed. The others leapt aside. Another convulsion twisted me, and a torrent splattered on the stone floor. Respail supported my head. And now, looking up from my will and turning to my shadow looming on the wall behind me, *i* can still see Respail's gentle face and the way it dissolved in my tears on that turbulent day.

{Which decompositions are practicable in an equation that is not simplified by the method of M. Gauss?}

The coach rumbled toward Bourg-la-Reine. How was *i* going to look father in the eyes? There was already enough concern etched in his face, enough sorrow in those eyes that used to flash and ignite my boyhood with happiness. My report would disappoint him yet again. How was *i* going to explain to him that *i* wasn't able to concentrate on anything but mathematics? *i* had to confide in him this time. Tell him that mathematics preoccupied me to the point of obsession, the way other boys of my age were preoccupied with promiscuity, revolution, adventure, successful careers. *i* would make a real effort this time, open up to him, get closer, make him feel a little happier. *i* dearly wanted to see him smile again. His smile would dispel the cloud of uncertainty that often gathered over my head, when *i* doubted the worth of everything, including mathematics.

A row of naked poplars whisked past. Jackdaws screeched against the icy-blue sky. Buttoned tightly in an overcoat, hands hidden in a furry burrow on her lap, a young woman gazed from the window. Her fragrance filled the coach. *i* opened my notebook and looked over the scribbled attempts *i* had made at solving the quintic equation. What was her beauty compared to the truth of mathematics? The coach jolted me, and our shoes touched. A charge went through me as she turned and apologised. Equations disintegrated, scattered like the flock of jackdaws. My attention ricocheted from her, to a willow uprooted in a creek, and back to my notebook. *i* concentrated on the quintic for the remainder of the journey.

A bell jarred me as *i* jumped from the coach. Mourners were following a black and silver hearse across the town square. Their baskets full of potatoes, two elderly women

crossed themselves. One whispered to the other that the poor fellow was found hanging from his children's swing after losing a fortune on the Paris stock exchange. Shouting my name, Alfred ran across the town square and wrapped me in a strong embrace. Two years younger than me, he was half a head taller. On the way home he complained that mother wouldn't allow him to study in Paris. *i* had been allowed to go at twelve, and he was already fourteen. He wanted me to side with him, to take a stand against mother's irrational objections.

There was a chilly atmosphere in the house, despite a well-stoked fire. Returning from church, mother came into the living room and stood very stiffly as *i* kissed one cold cheek, then the other. Forty two, she was still youthfully thin, and her movements were quick, at times abrupt. Her jawline, a sharply defined right-angle, was accentuated by the way she carried her head. Alfred was sitting in the corner, scowling. Nathalie came in, kissed me, asked about my studies and, without waiting for a reply, hurried out, saying she would be late for her lesson with the seamstress. A few years older than me, she had been seeing a banker's son and there was talk of an engagement. Warming my hands, *i* asked when father would be home.

- When he defeats the enemy, said Alfred.

- Politics! mother snapped. Dividing people in order to fill the jaws of hell. I hope you've got good news for him, Evariste. God knows, the poor man needs something to raise his spirits.

- Is father all right?

- The Royalists, Alfred replied, springing to his feet. We'll show them!

- Alfred! mother glared.

- Who's we? *i* asked.

- The Republicans, of course, Alfred declared, looking at me in surprise. We had a stone fight last Sunday. Should've seen the cowards run. Today it's stones, tomorrow it will be bullets on the streets of Paris.

- You'll never leave Bourg-la-Reine, said mother.

- Paris isn't far away, he retorted, and left the room whistling the Marseillaise.

- Hear that, Evariste? What we've had to endure lately! Little wonder your father's...

She broke off and paced the room with short, sharp steps. *i* felt uneasy in her presence. *i* wanted to be alone, to concentrate on the quintic. A log cracked, spitting a shower of sparks. She went on about politics twisting innocent minds, and how Alfred, a mere boy, was already talking of bullets. It was all the work of Satan. Armageddon wasn't far off. She sensed chaos and destruction in the air. Paris! It was Babylon, Sodom, Gomorrah all in one. *i* had heard this before: whenever she became irritable or angry she invoked Revelations, often quoting entire passages, as if the vivid, violent images purged her anxiety. She walked toward me and asked to see my report. *i* gave it to her with a defiant look. Standing beneath a lamp on the wall, she held it up and read in silence, her thin lips twitching, her cheeks becoming crimson. *i* turned to the fitful flames. If only *i* had a place of my own, if only *i* were allowed to stay in father's apartment in Paris, *i* wouldn't have to put up with these distractions. An hour here, an afternoon there, and my youth was slipping away, my energy and talent were being squandered on trivial things. Mathematics, that was what really mattered - everything else was a waste of time.

- Totally unacceptable! she flared, waving the report. Your father will be upset. No progress whatever! I knew we shouldn't have sent you to Paris.

As she harangued Paris and me, *i* stared at the clock on the mantelpiece above the fire. It was striking five. Numbers in a circle. Numbers in a line. Time as a circle. There was some relationship between time, number and the circle, but before *i* could grasp it fully father

entered the room, bringing the evening chill with him. *i* kissed his sunken cheeks and helped remove his overcoat.

- We're in for icy Christmas, he said. Our new priest would have me burn in hell.

A forced chuckle crumbled into a hoarse cough. He became thoughtful for a moment, his back to the fire, toasting his palms. *i* was concerned by these lapses of his: he hadn't been one for brooding. Were things really that bad? Were his enemies getting the better of him? He looked at me and asked what *i* had brought home from school. Mother handed him the report with a cold look and left. He sat in an armchair, crossed his thin legs, and read at arm's length, shaking his head, pinching the skin under his chin. He placed the report on a side-table and pointed to the chair beside him. Flames twisted to free themselves from the charred logs.

- Ah, Evariste, he sighed, closing his eyes, rubbing his forehead. I expected a little hope from you at least.

His tone alarmed me. Hunched in the armchair, he appeared a shadow of the man he had been only a year ago. Suddenly, *i* understood Alfred's anger. *i* wanted to reach out to him, restore the light in his dull eyes, smash his enemies. But *i* quickly checked this impulse. What about my mathematics? Should *i* deny my higher calling? Become embroiled in politics?

- Help me, son.

For a fleeting instant *i* saw myself in his features, like those ambiguous drawings in which the face of one person quickly alternates with the face of another. Should *i* tell him about the progress *i* was making in my work? Why hadn't he commented on Vernier's report? *i* recalled his attitude to mathematics: a diversion, a topic for conversation over a glass of wine. He would never understand that for me mathematics was as compelling as religion, politics, the pursuit of profit.

- Alfred's been neglecting his studies, he continued. Yes, yes, I know there's a good reason for it. But how can I consider sending him to Paris when you come home with a report like this? He looks up to you, Evariste. Please, son, set a good example for the boy.

i nodded. He became thoughtful again. It was now dark outside. The wind was whining along the side of the house, rattling the branches of the fig tree against the windowpane. *i* turned to the fire. If all was number, as Pythagoras had taught, what was the relationship between fire and number? Prometheus and Pythagoras: both were benefactors of mankind. One elevated mankind to a higher plane by the gift of fire, the other offered the key to divinity. More than any natural thing, fire was most like the mind, especially a mind filled with mathematics.

- Don't waste another year, son. Get your baccalaureate. Help me run the boarding school. Together we'll overcome those trying to undermine the school's reputation. We'll show the Jesuits! We'll make the school more liberal, more prosperous.

i didn't want to run the school and end up like Vernier: teaching an undisciplined class, ears crimson from straining to impart a few scraps of knowledge. Bourg-la-Reine wasn't for me. Over the last few months *i* had been thinking about the Polytechnic. It was one of the world's great centres for the study of mathematics, with some of the finest teachers and researchers. That was where *i* belonged, where *i* could devote myself to my calling. The idea of entering the Polytechnic had made my confinement at Louis-le-Grand bearable, especially during the last few weeks, when the bleak weather and early nights had forced students indoors, into each others company. Entry to the Polytechnic was by a special examination, which could be taken without restriction on age. Father's desperate wish for me to run the boarding school made me even more determined to sit the examination as soon as possible.

The visit home was unbearable - at times worse than being at school. When *i* wasn't

hounded by Alfred, who implored me to intercede in his quest to study in Paris, *i* was cornered by mother, who cautioned me against temptations with passages from the Bible, or called into the study by father, who sought my support against the growing enemy. If it hadn't been so cold *i* would have escaped the family by going to grandfather's cottage in the almond grove, and carried out my investigations into the quintic or indulged in dreams of the Polytechnic.

One afternoon, after having been confined indoors for a few days by bad weather, *i* grew so agitated that, the moment the rain eased, *i* took my notebook and left without a word. There were few people outside. The wind battered the white Royal flag raised in the centre of the square. A small boy ran out from a lane rolling a hoop which rang over the glistening cobbles. Striking a protruding stone, the hoop jumped from the rod guiding it and struck me at the knee. As the boy came running, *i* picked up the hoop, surprised by its warmth. He apologised with a puff of vapour, his face red from the cold. *i* gave it to him, and in an instant it rang across the square. What difference was there between that hoop and the circle that had absorbed old Archimedes before his death? The hoop was its own end, and even though it may have once been the rim of a small wheel, it was now an object of free play, no longer pushed with a purpose. Absorbing the boy with its form, the hoop was essentially the same as Archimedes' circle, which had also been an object of pure play, pleasing the old sage, restoring him to a state of innocence.

The chill was keener in the wet shadow of the church, where *i* had seen the gypsy last spring. Beckoning passers-by to take shelter from the cold, the open doors were panelled with two rows of rectangles carved with chaotic scenes from the Apocalypse. Suddenly the church was my escape from the family: a refuge where *i* could sit alone for a few hours and concentrate on more important things. It was empty inside. Seven spearheads glowed from a candelabra. Sunlight beamed through the circular stained-glass window above the altar. *i* sat at rear pew and tried to concentrate on the quintic, but the vivid colours and forms distracted me. The circle of light, the circle of life, *i* repeated several times. Mother had brought me here regularly as a child. At ten or eleven *i* became very religious. *i* liked the order and harmony inside the church. *i* would gaze at the window circling the golden-haired Christ with crimson roses blooming from his brow. He had replaced Ajax as my hero. As the priest delivered the sermon, *i* would daydream of giving my life in some great act of self-sacrifice. But it was all a passing phase, and then Napoleon took Christ's place. Now *i* felt distant from the figure in the circular window. Had Christ heard of Euclid? Could he understand geometry? Perform a miracle like cube the sphere or square the circle or trisect an angle? Where did Christ and mathematics meet? Were they mutually exclusive? A more significant miracle, one more convincing than turning water to wine, would have been to outline a general solution of the quintic fifteen hundred years before anyone had even conceived of the quintic. Christ and Pythagoras: both were spiritual, ascetic, reformers, teachers, and both died for their beliefs at the hands of an ignorant society. Christ believed in the Trinity; Pythagoras, in the right-angled triangle. But what did the Trinity mean to a Turk? Pythagoras' Theorem was different: the simple relationship between the perpendicular sides and the hypotenuse was true for all faiths and everywhere in the universe. Not only this, the Theorem had a miraculous power: given two sides one could, without measurement, with eyes closed, determine the length of the third side. This couldn't be done with the Trinity. Given the Father and Son, one couldn't grasp the Holy Spirit; or given the Father and Holy Spirit, one couldn't pinpoint the Son; or given the Son and Holy Spirit, one couldn't specify the Father.

Shawled in black, an old woman limped in, carrying a basket full of wrinkled apples.

She dipped her fingers in the holy water and shuffled to a pew at the front. The Christain cross was for her: a crutch for flesh and bone. The new cross, the symbol of the new religion, was the pronumeral x : the great liberator, as Vernier had said. It would empower the mind to overcome its dependence on matter and rise to the highest realms. This holy x would restore the mind to a state of innocence, fill people with the sense of wonder enjoyed the ancients, before the onset of the Dark Ages, when people were burdened with guilt.

i was startled from my thoughts by a tap on the shoulder. A priest was sitting on the edge of the pew behind me. He extended a palm in a gesture intended to allay my obvious alarm. He was about thirty, with ginger hair cropped close to the scalp. *i* slipped the notebook into my pocket. He asked if anything was troubling me. No. Would *i* prefer the confessional? He point with a gingery finger to a booth across the nave. Youth could be a difficult time, he smiled. *i* had come to be alone for a while.

-You've done well to come.

He paused, scratched a spot of candle wax from the pew's backrest, and then focused on my notebook.

- What have you got there?

i reached for the book as though someone had tried to snatch it from me. Was it a diary? There was no need for me to be embarrassed. He knew the temptations of the flesh. What gave him the right to assume that *i*...? It was a difficult time for young people, he continued, adjusting the black band around his waist. *i* shouldn't be misled by the atheists. They came in all sorts of disguises: lovers of freedom, Republicans, humanists. When the liberals had their way, they drenched Paris in blood and instituted a Republic. They turned from God and believed that man could take His place. And what happened? Napoleon emerged, crowned himself emperor, and attempted to take the place of God. That incarnation of evil led France into the abyss. He cursed on all liberals, and was certain they'd burn in hell. His face glowed crimson, his green eyes glinted like pieces of broken glass, the large vein in his neck bulged under the constricting collar. So, this was father's enemy - the priest undermining his position.

- Father wouldn't condemn anyone to hell!

The words reverberated in the nave. Taken aback, he squeezed his forefinger between collar and neck and moved it from side to side along the sharp edge. His time was over, *i* continued, my voice quivering. This was the new religion. *i* pulled out the notebook, opened it to a page covered in algebra and raised it triumphantly. Mathematics, *i* shouted. The word spread and filled every corner of the nave. The old woman was shuffling to the front door. These were the new symbols. This - the new cross. *i* flicked the pages in his face, pointing to circles, equations, x 's. Mathematics - the new saviour, *i* shouted, emboldened by his silence. His cross was a millstone around people's necks. The new cross would give people wings.

- Are you a student at the boarding school?

i brushed past him and knocked the old woman's basket on my way out. Small red apples rolled over the geometrical patterns on the tiles.

{I have called those equations *primitive* which cannot be simplified by M. Gauss's method; not that the equations are really indecomposable, as they can even be solved by radicals.}

Boots - that's what *i* lack. A shining pair to go with my uniform. *i* am not destined to die a hero in a revolution, so *i* might as well look the part in the morning. How long have *i* had them? Didn't Alfred buy them for me just after *i* was imprisoned? They've become a part

of me. Unlike clothes which fade and wear in the same way for most people, shoes are worn and shaped by a person's weight, their manner of walking, their very character. *i* feel sorry for myself at their sad condition in the corner. Pigeon-toed, badly scuffed, crushed above the heel, full of darkness.

{As a lemma in the theory of primitive equations solvable by radicals, I published in June 1830, in Ferussac's Bulletin, an analysis of imaginaries in the theory of number.}

It was a few days before Christmas, and d'Herbinville was addressing a contingent of artillerymen in the barracks of the Louvre, where the third battery had been posted for the day. Standing on a powder keg, he spoke in a strong, resonant voice, saying that crowds were filling the squares and crying for the heads of the Ministers responsible for the carnage in last July's revolution. The people were waiting for the spark. If the House of Peers didn't impose the death sentence, we would open the gates, arm the crowds and lead them into battle.

Shouldering a musket, *i* stood at attention, ready to take on the world in my new uniform. Mother had stood firm. *i* had even threatened to kill myself if *i* didn't get the 250 francs. *i* told her that my death would be on her conscience and returned to Paris dejected, not knowing how to face d'Herbinville. When we met a few days later, he greeted me with a warm embrace, listened sympathetically, and offered to pay the levy for me. He had helped a few others in this way, he said, and was certain *i* would serve the cause with honour. Honour? *i* would give my life for the Republic.

An icy wind strengthened, stinging my ears, watering my eyes. There was a smell of gunpowder in the air. d'Herbinville's look filled me with courage. *i* was ready to follow him anywhere. Stay alert, he advised. Wait for the signal. We were on the threshold of a revolution more explosive than the one last July.

In the barracks an hour later, *i* stood at the window with two other new recruits, watching the soldiers on duty in the courtyard, waiting for the signal. Father's death, my failure to enter the Polytechnic, my recent expulsion - everything would be avenged once the signal was given.

- Louis Philippe's days are numbered, said Duchatelet, who had suspended his studies for the cause.

- No more Kings, smiled Lebon, chewing licorice.

After an exchange of barbed whispers, two artillerymen in the back corner started abusing each other loudly.

- She's a worthless slut.

- I'll cut your tongue out.

- I had her under the stairs.

- Liar!

They scrambled up, grabbed their muskets and thrust at each other until they were drawn apart to opposite ends of the barrack. *i* became angry. Here we were on the verge of making history, and those fools were squabbling over a woman. As the shorter of the two struggled to break free of those restraining him, two brass buttons snapped from his coat. One flew into the mouth of the stove, the other rolled to my feet.

- Shut up! *i* shouted, kicking away the button. Die for the Republic, not for a woman!

Stunned, they turned away from each other. The shorter one scraped about on hands and knees, looking for his buttons, while the other swaggered to his bunk.

- Are they Republicans? *i* whispered to Lebon.

- As much as you or I.

As voices hummed and camomile-scented steam rose from the kettle on the stove, *i* honed my reflection in the bayonet with a black whetstone until we went out on duty again. *i* hardly felt the cold as *i* stood at attention. My expectation grew with the size of the crowd gathering on the other side of the fence. An hour earlier, word had reached us that the Ministers were to be imprisoned for life and that they had been taken from the Luxembourg and locked in the well-protected prison of Vincennes. Outraged at the verdict, the crowd had surged to the Louvre. But Louis Philippe was shrewder than we thought: he ordered his troops and the National Guard to surround the Louvre. The crowd froze at the sight of so many soldiers, and a tense stand-off arose. An outer ring of troops faced the crowd, an inner was turned to the Louvre.

- We're outnumbered ten to one, whispered Duchatelet, his words vapourising.

- We're not alone, *i* replied. The crowd's waiting for us. One shot and they'll explode.

d'Herbinville marched past the lines and spoke to the men guarding the cannon. Steps crisp on the cobbles, he approached us and told us to stand firm. Tall, square-shouldered, standing against the background of iron bars, troops, people, he was more impressive than ever. If he gave the order, *i* would be first to open the gates and lead the charge. We mustn't provoke the troops, he said. We should let them make the first move. The crowd would be more sympathetic to us if the King's forces were seen as the aggressors.

Darkness closed in upon the city, moving silently from tree to tree, lamp-post to lamp-post, bayonet to bayonet, filling the cannon's mouth, the pupils of a red-cheeked recruit. The wind died down, and with it my sense of expectation. The crowd began dispersing, the troops appeared more relaxed, fires were lit. Soon troops and civilians were fraternising, brought together by the need to warm their hands. A fire was lit in the courtyard. Snowflakes fluttered lightly over my face, caught on my lashes, settled on the cannon.

The solstice night passed slowly. Artillerymen took turns in going inside to rest and warm up. When my turn came, *i* refused to leave the courtyard. Lebon and Duchatelet tried to draw me away, but *i* insisted that *i* wasn't tired, and they left me, shaking their heads. How could *i* claim to be a true Republican if *i* couldn't put up with cold and fatigue for the sake of the revolution? Yes, the chances of anything happening to tonight were small, but that was even more reason to keep vigil through the long night. The Garden of Gethsemane - mother had read that story many times, and *i* had always been disappointed that the disciples couldn't stay awake when so much depended on their vigilance. Now *i* saw myself as a disciple of the Republic, and for its sake *i* had to withstand the cold nibbling my face and a numbing feeling of hopelessness.

Flocks of geese screeched overhead as the night loosened its grip. An artilleryman aimed his musket and cursed that he wasn't allowed to bring one down for a Christmas roast. *i* stopped pacing. The crowd was building up again, and the troops had returned to their ring formation. But the atmosphere seemed more relaxed: people on their way to work were stopping out of curiosity, not from a desire to start a revolt. As the hours passed and the likelihood of a revolution receded, the scene began to resemble a carnival. Vendors of all kinds appeared and mingled amongst the crowd. Children ran and laughed, chasing each other between the troops.

My hopes were suddenly boosted by the appearance of students from the Polytechnic. They would incite the crowd, as they had last July. Watching for a sign of unrest, *i* noticed that a few vendors had slipped through the cordon of troops, and were now standing at the fence, trading briskly with the artillerymen. Soon relatives and friends of the artillerymen followed the vendors' lead, and people were conversing through the barred fence. A section

of the crowd addressed by a Polytechnic student began dispersing. Some went and shook hands with the troops, others left the scene all together. *i* approached the fence. Lively trade and conversations were in progress.

- A sou a piece, shouted a vendor, almost jabbing me with a long skewer full of steaming sausages.

- Why aren't they listening to the students? *i* asked, pushing the rod back between the bars.

- Fresh, grinned the vendor.

- Why are they leaving?

- The students are calling for restraint. Saying Louis Philippe won't betray us. *i* backed away.

- All right, three for two sou.

Within an hour the crowd had dispersed, the troop had marched away, and the gates of the Louvre were opened.

{There will be found amongst my papers the proof of the following theorems:

1^o. In order that a primitive equation be solvable by radicals its degree must be p^v , p being a prime.}

i had been living in our Paris apartment until the week after the incident at the Louvre, when mother carried out her threat and rented it to a writer, forcing me to return home until *i* could find other accommodation. *i* wore the uniform around the house in protest. Following the failed revolt, a royal decree had disbanded the Artillery division of the National Guard and prohibited members wearing the uniform. Nineteen officers and activists, among them Cavaignac and d'Herbinville, had been charged with fomenting unrest and conspiring to arm radicals with muskets and cannons. Angry at being forced return home, *i* was more irascible than ever, arguing repeatedly with mother over both the her objection to the uniform and her insistence that *i* find work. After one particularly heated exchange, during which she threatened to evict me from the house, *i* went to my room and stood before my slightly distorted reflection in the wardrobe mirror. *i* admired myself, compared myself to d'Herbinville, cursed Louis Philippe as *i* unbuttoned the jacket. The uniform had given me meaning, hope, a sense of belonging. *i* felt strong in it, as strong and confident as d'Herbinville. The boots, the full trousers, the coat's padded shoulders - they added to my stature, made me appear robust. Now, standing before the mirror in only my underwear, *i* was once again a youth with thin arms and slightly bowed legs. *i* looked at myself from one side, then the other, even stood with my back to the mirror and looked over my shoulder. If only *i* had d'Herbinville's physique, his bearing. *i* dressed and put the uniform away. The day would come when *i* would wear it on the streets of Paris again, leading the people in what would be the final revolution.

{2^o. All the possible permutations of such an equation have the form $x_{k,l,m,\dots} | x_{ak+bl+cm+\dots+h, a'k+b'l+c'm+\dots+h', a''k+\dots}$ k, l, m, \dots being v indices, which, taking p values each, denote all the roots.}

My brisk shadow led me out of the Louis-le-Grand courtyard. A few more months,

and *i* would be leaving for good! *i* hadn't prepared for the entrance examination to the Polytechnic: *i* was confident my knowledge of algebra and geometry could meet any challenge. Be patient, Vernier had advised. *i* was still young. *i* should do a year of advanced mathematics with monsieur Richard. Prepare thoroughly. Pass with distinction. Why rush into such an important examination? The entry regulations were quite clear: anyone who failed in their second attempt was precluded from sitting again. Vernier's talk of failure annoyed and disappointed me. *i* had in been in his class almost a year, during which he had often commented on my ability - why this restraint now? While most of the class were still struggling with quadratic equations, *i* was working on the solution to the quintic. To enter the Polytechnic a year early! That would be an achievement, a sign of talent! Vernier didn't understand. There were many reasons why *i* had to enter the Polytechnic: to ease father's concerns about my future, to escape the confines of Louis-le-Grande, to spite the teachers who doubted my ability.

A new life only hours away, *i* was in high spirits on this warm July morning. The leafy boulevards were noisy with carts and carriages. Shutters had been thrown back, as though they were arms outspread to embrace the sun, to welcome it into rooms glittering with chandeliers, or blackened by coal smoke. On balconies women beat coloured rugs, men scraped soot from braziers and flues, mattresses were flung over railings, bristling with straw. Everywhere people gathered in groups large and small: groups speculating outside the Bourse, groups conversing in cafes, groups packed in reading-rooms, groups gathered in public squares. Passing through a damp archway reeking of wine, *i* found myself in a courtyard where a group had gathered around a speaker mounted on a barrel. *i* stood in a doorway, behind me two small girls rattled knucklebones on the floorboards. In his twenties, the speaker flourished a rolled newspaper, his face flushed, almost purple. They would show King Charles and his lackey ministers, he shouted. Applause erupted. The speaker became even more impassioned, bolder in the way he swept the newspaper above his head. And how was the Republic going to be won? By blood, good citizens! His blood, their blood, the blood of the young man in the doorway. Pointing over the heads of those at the front, he arrowed me with his forefinger. A few of the listeners turned. When the revolution started, students of my age would be in the front ranks. A knucklebone rattled to my feet. *i* was about to pick it up, when one of the girls scurried on hands and knees, snatched it in a grubby fist and returned to her playmate.

- Blood and ink, good citizens! he shouted.

He unrolled the newspaper and held it up for them to see. It was in everyone's interest to ensure a free press. Charles had to be opposed in his plans to restrict the liberal papers. Blood must be shed for the sake of the press, for it was through the press that they would have new charters, fairer laws, the just constitution of the Republic. Clapping, cheering, cries of 'Long live the liberty of the press' resounded in the courtyard. Satchels strapped over their shoulders, five or six youths appeared and stood in the archway with arms crossed. *i* stepped from the doorway as an old ragpicker shuffled past, bent double by a bundle on her back, muttering to herself that the Kingdom of God was at hand. The speaker deftly rolled the newspaper and shoved it in his jacket. Palms blackened by ink, he wiped them on his dark-blue trousers, warning them that the greatest obstacle to a Republic were the self-serving Jesuits. They mustn't be seduced by their false promises, he said, pointing the paper skyward. The rise of the Jesuits during the last ten years had been at the expense of the working classes. They were in league with the King. Napoleon had broken their power, exposed them for what they were, and now they were filled with hatred and revenge. They were an army, determined to dominate France by means of Bible and cross. They would stop at nothing in

order to control the hearts and minds of innocent children. As the crowd chanted 'Down with the Jesuits', the youths retaliated with 'Down with atheists' and pelted the speaker with tomatoes from their satchels. A section of the crowd turned on them, but they managed to flee, pursued by a dozen men spitting obscenities. A horse harnessed to a cart reared, spilling its load of pears. Children rushed out and filled their pockets. The vendor shrieked from child to child, struggling to dispossess them of his pears. Laughter poured into the courtyard from doorways, balconies, windows on the third and fourth floors. *i* hurried away from the commotion, trying to focus on the examination, cautioning myself against the city's distractions. The Polytechnic - that was what *i* had to keep in mind. *i* should be anticipating questions, preparing myself mentally. A pity it wouldn't all be a written examination. Words had a way of getting tangled in my throat. When attention was focused on me *i* became disconcerted, lost my thread. A blank sheet - that was a different story. The silence of white - that was my element .

People were shouting excitedly on the side of a canal, pointing at something in the sluggish green water. *i* leaned over the side of a stone bridge. A flotilla of books and papers had stopped against a pier. Among them, a head - a man's, mouth gaping, sockets black. *i* shuddered. A rat emerged from the mouth and climbed onto forehead, where it began nibbling in the socket. The crowd's cries became louder. A volley of stones failed to frighten the rat. A grappling hook flew through the air, but fell short of its mark. Raising its glistening snout, the rat twitched and darted back into the mouth. The head nodded, then shook from side to side. *i* hurried away, swallowing back a feeling of revulsion.

- Out of the way!

i leapt aside as a barrel-chested man with a plough on his shoulders trotted past, heaving at each step, broad feet slapping the slime oozing down the middle of the street. The squalor in the working-class suburb was highlighted by the searching sun. *i* had never walked through such misery before, never seen such poverty, so much overcrowding, so many forlorn faces. If *i* discovered a formula for generating prime numbers would that assuage the young woman smothering her sobs with her palms? If *i* solved the quintic would that alleviate the suffering in this place by even a fraction? How could *i* justify the pursuit of mathematics in the light of this misery? What was the meaning of a transcendent truth to that old woman elbowing a bare table? What was the relevance of imaginary numbers to the men in that basement foundry? Their sweat was the only reality, and it dripped into molten metal.

Strange, it was Dante, one of mother's favourite authors, who helped against the sense of futility that threatened to overtake me. Why had Dante entered purgatory? To alleviate the suffering of the damned? No. To test his vision of paradise. If the horrors had overwhelmed his vision, that would have proved he was unworthy of paradise. Suddenly *i* saw this terrible squalor in a similar way: if my faith in mathematics stood firm, *i* would enter the paradise of the Polytechnic and become a great mathematician.

Once again my mind was a furnace devouring the world. *i* saw mathematics everywhere. The curve of a clothes line hanging between two walls could be expressed in terms of the magical x . Water streaming from a tap was a continuous functions. Some day there would be a state of being where such functions were as vital as water. At the sight of an old man shuffling in a pair of large army boots, with a round loaf tucked under his arm, *i* imagined a world where man lived on circles alone.

In a quieter suburb, narrow streets and lanes twisted into each other. Heading in the direction of the Polytechnic, *i* came to a fork in an uphill street. *i* went left, and continued climbing until *i* encountered another fork, this one with three branches. Guessing, *i* chose the middle and followed it for a short distance. A dead-end: a blue-stone wall painted with

concentric yellow circles. *i* hurried back to the fork, took the left branch and ended up in a small square, from which five streets radiated. *i* started to panic. No more random decisions. *i* looked around for a hint. The square was deserted, distant music mingled with the trickle of a nearby tap. A grey horse accorded me a disinterested look in nodding past. In its moist pupil *i* was a dwarf and the town square was twisted into a rhombus.

i descended the steps of a clockmaker's shop. A silver bell giggled. A man with albino features peered at me over the top of a pair of pince-nez.

- At last!

His bass voice echoed in the small shop. He was robust, with the hands of a stonemason. Straightening his back, he performed a few head-rolling exercises, cracking the bones in his neck. A clock on the bench chimed a lively waltz.

- So, you're Pierre's son?

Intimidated by his size and the tone of his voice, *i* nodded. When had *i* had decided to become a clockmaker, he bellowed, but didn't wait for a reply. It wasn't easy. Making clocks was both an art and a science. *i* would be wasting his time if *i* didn't have a feel for both. A clock's heart was all mathematics, its body all art. And a well-crafted clock was one that had to be both cruel and kind: to strike out the succession of moments according to an implacable law, while softening time's impact with a cherub's smile, a cuckoo's call, or a pleasing melody.

- Understand that, sonny?

i felt trapped. The examination was at eleven. *i* had lost all track of time, though it couldn't possibly have been past ten. *i* wanted to ask him for directions to get out of this labyrinth, but his words were like rolling boulders.

- Consider the variety of clocks, he continued, sweeping his powerful arm in a semicircle. But behind their differences they all have something in common.

He moved closer, his enormous girth between me and the door. Removing his pince-nez and slipping them into the top pocket of an oil-stained coat, he leaned forward and placed his arm over my shoulders, almost overpowering me not only by the weight of his arm, but by the smell of his body odour. If *i* were going to be his apprentice, *i* should listen and learn. It was like this: just as the endless variety of human features concealed the existence of an immutable soul, so... He paused, gathered his thoughts, and puffed his chest to release another storm. A blue cuckoo darted from its retreat, teased me and sprang back as the clockmaker continued. His assembly of pendulum clocks had this in common: the period of a pendulum's swing is equal to twice the ratio of a circle's circumference to its diameter, multiplied by the square root of the pendulum's length divided by the constant of gravity. With his small finger he wrote the formula on the dusty side of a still grandfather clock cofined in oak.

- What time is it? *i* asked, manoeuvring from under his arm.

- Time! Look around you, sonny.

There must have been a hundred clocks, with no two showing the same time. He refused to give any one prominence, and he couldn't bear to have them all chiming in unison. So he had arranged them in such a way that the correct time could be calculated with simple arithmetic. If one took any three clocks, arranged them in size from smallest to largest, subtracted...Conundrums! At a time like this! My future was at stake! *i* dashed out into the sunlit square, the silver bell snickering behind me. Not a person in sight. Desperate, *i* stopped near a tap. The music was louder, livelier than before. The shutters of a third storey window squeaked open and a man leaned out, holding a black quill in one hand, a sheet of paper in the other. As our looks met, he shook the paper, scattering a flock of pigeons from the spotted balustrade of an adjacent building.

- What's the time? *i* shouted above the whirring wings.

The sheet slipped from his fingers and fluttered above the square. As though by reflex, *i* followed its erratic movement in order to catch it, but it eluded me and fell in the water-trough under the tap. When *i* picked it up, the black ink was already running, the letters were losing their shape, the words were dissolving before my very eyes. It was a poem, a sonnet. *i* was just able to make out the title, ZERO, before it blurred to an illegible blot. As for the text, *i* managed to salvage the odd word here and there, before it returned to the blackness before all alphabets. It was like waking from a dream in which *i* had been reading a new, wonderful proof, only to find it dissolving in the light of day. Leaving the wet sheet on the edge of the trough, *i* hurried toward the music.

A summer carnival was buzzing on a tree lined boulevard. The Polytechnic was on the other side. *i* entered the throng and was soon pulled into a ring of revellers dancing to a drummer, a flute-player and a fiddler. *i* tried to break through, but the ring contracted. Men and women, angels and demons, gods and beasts howled with happiness.

- Let me out! *i* screamed.

The drummer hammered louder, the flute player shrilled in my ear, the fiddler grinned and sawed vigorously. *i* rushed at the clasped hands of two angels: their grip snapped and *i* stumbled into the surrounding throng. *i* tried to subdue a growing panic by recalling Lagrange's assertion that the solvability of a polynomial equation was somehow related to the substitutions performed on its roots. But order, arrangements, patterns within a group of substitutions, the structures of groups within groups - all this was swept aside by the chaos around me. *i* was drowning in a flood of humanity.

A clock in a funeral parlour eased my mind. *i* slowed down and tried to regain my composure, focus on the examination. Groups of students in bright military-like uniforms were enjoying the warm sun outside the Polytechnic. *i* would soon be wearing that uniform, studying mathematics at the highest level. But the students here looked so grown-up, they had moustaches and whiskers - *i* was a boy in comparison. *i* approached a group denouncing King Charles. One of them swore that, given half a chance, he would assassinate him. *i* asked for directions - an ink-stained finger pointed to a door across the courtyard.

Mathematicians in ornate frames hung from the walls along the corridor which receded to a small window in the distance. *i* stopped between facing portraits of Newton and Leibniz. Turning from one to the other, *i* tried to read the lines and creases on their faces, to fathom their eyes, determine whose features expressed more genius. An abundant wig coiling onto his shoulders, Leibniz looked at me with worldly eyes, while his lips seemed to suppress a smile. Within the external borders of a rectangular frame, he was depicted in an oval frame mounted on a mantelpiece. A cape flowing over his left shoulder spilled from the oval, onto the mantelpiece, to the lower edge of the rectangle. Slightly longer, and it would have spilled into the corridor. On the other side, seated rigidly in an armchair, Newton appeared troubled, uneasy, as though resenting this interruption to his work. Sitting for this portrait was a waste of time, he seemed to be thinking. Posterity wouldn't be enlightened by the length of his nose or the curve of his chin. There was no need for portraits: let future generations recreate his features as they wanted. The face, the body, the man: from dust to dust. The corpus of work: that was all that mattered in the end.

There were seven or eight others in the waiting-room. *i* sat on a bench and focused on a nailhead protruding from a black knot in the floorboard. Papers and pages rustled as a few eager candidates did their last minute preparations. *i* darted furtive glances around the room. Did they have the same aspirations as me? Did any one of them have my passion for mathematics? Was the Polytechnic sacred to them, or was it nothing more than a means to

secure a place in society? Not one of them looked like a mathematician. They weren't here for knowledge, but for a good-paying profession.

Stiff in a starched collar and cravat, the examiner yawned as *i* entered the room. He sat at one end of a long table and a bearded secretary at the other, quill poised, ready to record proceedings. Despite the stuffiness in the room, the windows were all closed. *i* glanced at my reflection in a glass covered bookcase: a boy, standing a little hunched, waiting to be admitted into a man's world. *i* answered the examiner's terse questions about my background with a quiver in my voice. He nodded drowsily. His questions that followed were taken straight from a text-book, anyone could've answered them - anyone, that is, who had drilled themselves on monotonous exercises. *i* was taken by surprise, even though Vernier had warned me. In my daydreams *i* had imagined the examiner would recognise my talent at once, if not from my face and the light in my eyes, then at least from a few probing questions meant to test insight and ingenuity. Instead *i* stumbled on one question, hit a brick wall on another, fell into a hole with a third. *i* became flustered, words tangled into each other, my ears hissed. The examiner and the secretary exchanged looks. The quill scratched furiously. Why wasn't *i* given a chance to show my understanding of equations? Where were today's Pythagoreans? Those masters who could look into a person's soul and determine whether or not one was suitable for the highest calling? The examiner's questions were designed to select mediocrity. Why was *i* being subjected to this farce. *i* clenched my fists, bit my lips. They weren't going to make a fool of me!

In the corridor again, between the gallery of portraits, *i* sensed their eyes following me, and *i* felt humiliated in their presence. *i* had dreamt of entering this place, and now *i* was on my way out like a...Descartes stopped me. Don't be too presumptuous, he seemed to say, eyebrows arching distinctly. Doubt everything, including your innermost dreams, reduce yourself to nothing, and through that you'll know if you're meant for mathematics. Shame burned my cheeks. Maybe *i* lacked talent, maybe my belief in myself was nothing more than conceit. There was a real genius: Descartes, seated on a solid chair, feet squarely on the floor, quill about to dip into a pot and add to that thick volume on the table.

i left the Polytechnic feeling rejected, a failure. Another year at Louis-le-Grand! *i* didn't want to return to that prison. On the street, *i* thought of running away. *i* wanted to lose myself, get away from everyone and everything, including mathematics. Stowaway on a ship bound for America. But father's troubled face came to mind. *i* didn't want to add to his problems. A whip flicked, horseshoes scattered, a driver spat abuse at me. A fashionably dressed young couple sped past, laughing. Just yesterday *i* would have countered their stupidity with the serious nature of my vocation, now *i* was crushed by it. Was that the essence of life? They found meaning in each other, saw themselves reflected in each other's pupils, gave each other an identity. Where was my meaning now that *i* had been rejected by the Polytechnic? What was my identity now that *i* questioned my talent for mathematics?

- Cocoa! Cocoa!

On a busy bridge a vendor shot a hopeful look from under a broad-brimmed hat. A gleaming urn was strapped on his back, small metal cups dangled from a belt around his waist. Despite his ragged appearance, he had a firmer hold on life than me. Strapped to the urn, he belonged to the city, carried its reflection on his back, served it day and night. By comparison, *i* was a blank sheet torn from a book and thrown to the wind. Slipping from my image in the urn, *i* turned and leaned over the railing. The water was thick with sludge. All *i* had to do was climb the waist-high wall.

i wandered in a daze until *i* found myself in a poor suburb. A group of boys about my age, saddled with baskets, dressed in tatters, feet wrapped in rags, were scavenging a

mountain of refuse. They were the children of the streets, who ferreted the city's garbage for their existence. What was my rejection compared to their misery? Poor souls! Rejected by families, society, God. Yet, there they were, determined to find another scrap, tenacious in their struggle to exist. Was Louis-le-Grand worse than that pile of stinking garbage? It was said monsieur Richard was a good teacher, a real mathematician. Maybe a year in his class of advanced mathematics would prepare me for the Polytechnic. There was still hope. The failure didn't mean a thing. The examiner hadn't given me the opportunity to reveal my talent. Next time - *i* would show him!

{The indices are taken with respect to a modulus p ; that is to say, the roots will be the same if we add a multiple of p to one of the indices.}

This afternoon, looking at the outline of a crimson cloud, *i* saw the profile of an ancient mathematician and was reminded of a recent dream. Strange, if *i* hadn't been at the window, or if the cloud were slightly different, *i* might never have remembered the dream and it would have been lost for ever, as though it had never been. *i* was standing in front of an ancient temple. My novitiate complete, *i* was about to be accepted by the highest order of the mathematical fraternity. *i* climbed the steps and stood in the portico, before a pair of bronze doors panelled with scenes from the lives of mathematicians. It was cool inside, dim, incensed. The floor was tiled with a regular pentagon: golden lines connected its diagonal corners to form a pentagram, which in turn embraced a smaller inverted pentagon in which the altar had been placed - a marble cube the height of a man. Streaming through a circular opening at the crown of the dome, sunlight fused with the fragrant smoke writhing from lamps and censers. Linear rays illuminated the altar. Faces emerged, solemn, mounted on tiers around the temple's circular walls - a host of mathematicians had assembled to witness my initiation. Cowled, the fraternity's high priest appeared from a thicket of shadow and smoke, placed a compass and straight edge on the altar, and summoned me with a hand glowing in the swirling light. *i* stopped at a vertex of the pentagram. The light became intense. On the dazzling altar, the priest unfastened a star-shaped brooch. The hood and robe slipped off and a naked woman stood with arms extended perpendicular to her body, feet together, a black equilateral triangle under her navel. It was her - Stephanie. *i* turned away from her, looked around for some explanation. The faces were now howling with laughter. Dreams! Mathematics has no place in them, *i* mused. The courtyard was empty. Her cat lay curled on the doorstep, sleeping in the afternoon light.

{The group which is obtained on applying all the substitutions of this linear form contains in all $p^v (p^v - 1) (p^v - p) \dots (p^v - p^{v-1})$ permutations.}

A burst of laughter drew me back to the classroom. The lesson was almost over and *i* hadn't heard a word the teacher said. He was now upbraiding me in a sarcastic manner, grinning that it wasn't enough to attend his Religion class in body alone. Forty eyes were on me, wide with the expectation. But *i* wouldn't give them what they wanted. *i* had stopped playing the fool, outgrown that perverse feeling of exaltation at being ridiculed by teachers *i* detested. Would *i* share my precious daydream with the rest of the class, he asked, standing above me, eyes sparkling. Too personal? In that case *i* would do well to read the next ten verses. No.

- Our dreaming prophet won't read.

i knew this teacher: his subdued tone belied the fact that he was taken aback by my reply. Why, he asked, and turned from me to the class. The Bible was irrelevant, *i* replied. The murmuring stopped. He crossed his fingers, cracked them by pushing them outward. And how had *i* reached such a conclusion?

- Mathematics? he echoed .

Turning slowly, he walked to the platform with measured steps.

- Go on, explain yourself.

- It's the religion of the future.

- Ah!

That protracted exclamation told me he was now considering his next move. Should he pursue the matter in front of the class, or dismiss it for now and deal with it later, when he could talk to me alone? He was aware of liberal and Republican ideas spreading through the school, the whispers of revolution, the atheistic attitudes of a growing number, but this was the first time that religion had been opposed by mathematics. What should he do? He had always been careful not to give radical students a forum for subversive ideas. But this was different, he must be thinking. He was curious about me - a loner who had never shown any interest in politics. My views couldn't possibly pose a threat. They wouldn't be taken up by other students: mathematics was the least popular subject on the curriculum, shunned by liberals and conservatives alike. There was no harm in finding out what went on behind my surly face. All right, take this. Mathematics, *i* said, in tone that surprised me. It would overthrow the old religions and establish a society without poverty, without stupidity, without death. The cross had lost its relevance. It was time for a new symbol to rule the world: the x of mathematics. Students applauded, whistled, hissed. The teacher thumped the Bible on the table and demanded silence. Somebody at the back whispered that *i* was one of them, another voice said *i* deserved to be taught a lesson. Yes, look at your watch, you coward, *i* thought. Five minutes before the bell. How was he going to reply? He was sorry for having provoked me. He was no doubt considering how to turn the situation to his advantage? He had better say something - the students were waiting.

Thumping the Bible again, he stared at me for a moment and began, choosing his words very carefully. People were moved by emotions, not mathematics. Spinoza, perhaps under the influence of my Descartes, had proposed a philosophy, a kind of religion, based on propositions, proofs, lemmas, corollaries. What had it led to? Nothing! Yet the plain truths of Christianity continued to move people with faith, hope and charity. *i* shouldn't be misled. Mathematics was godless - it would never satisfy humanity. We needed the mystery of love far more than logic of geometry. Mathematics was more important than love, *i* retorted, defending my faith. His so-called truth was easy, it appealed to fools. Real truth was difficult, intended for the few, those who were prepared to struggle and sacrifice themselves. There was no absolute truth in mathematics, he countered calmly. Pascal had abandoned mathematics for Christ. Why? Because he saw that mathematics couldn't satisfy the entire man. And from this it necessarily followed, with the certainty of my Euclidean logic, that anyone claiming they were fully satisfied by mathematics must either be lying or lacking in humanity. Quod erat demonstrandum.

The Latin was a slap on the cheek. The bell sounded and students began stirring and shuffling. Satisfied that he had won the day, he seized the moment, dismissed the class, gathered his books and left by a side door. *i* choked with rage.

{It happens that in general the equations to which they belong

are not solvable by radicals.}

There was only one cure for disappointment - work. *i* took Vernier's advice and focused on the quintic with even greater intensity. Finding its solution would also resolve the problems in my life. It would restore my belief in myself, help father, spite the Religion teacher, open the doors to the Polytechnic without having to sit an examination. Absorbed by the problem, able to work on it entirely in my head, *i* would often fall into a kind of trance, from which *i* had to be prodded to answer a question or move off at the sound of the bell. There were times when my thinking became less definite, expansive, intuitive - when *i* experienced the sensation of being mathematics, and then emotions, memories, self-awareness all vanished. After these fleeting moments, *i* was left feeling light-headed, disoriented, darkness humming in my ears. Later, pondering that sensation in the light of Descartes' 'I think, therefore *i* am', *i* wondered what would happen if those states were to last longer. If *i* could prolong them, make them last even an hour, *i* was certain that *i* would solve the quintic. But *i* was sinewed to a frail body, distracted by instincts, swayed by emotions. If only *i* were disembodied thought. What diabolical will had placed mathematics in a vessel subject to fatigue, hunger, decay, death? If mathematics was to be the new religion, shouldn't *i* become an ascetic monk? Subject myself to a strict regimen of diet and discipline? Prepare to serve mathematics?

In the refectory, as the others stuffed their faces, *i* nibbled a few scraps while contemplating the quintic.

- Are you all right, Galois? asked the student next to me. You haven't been eating much lately.

- Man lives by more than bread alone, *i* replied, gazing at my inverted image in the clean spoon.

- He's become religious, chuckled another.

- Renouncing food for the salvation of his soul? taunted a third.

- To Saint Evariste! proposed a fourth, raising a glass.

Five glasses of water meet in a single click. Yes, *i* would become Saint Evariste - a saint in the new religion.

{The condition which I have stated in Ferussac's Bulletin for the solvability of the equation by radicals is too restricted; there are few exceptions, but they exist.}

A martyr of mathematics! The foolishness of adolescence! And yet, even now, looking up from this last will and testament, *i* concentrate on the still flame and see that impetuous youth being interrogated by a brood of Jesuits.

- You're a heretic! one of them shouts, arrowing him with an index finger.

- Do you deny it? asks another.

- You've taken Christ from the cross and used the symbol to promote free-thinking!

Suddenly it becomes dark, and the youth is tied to a post in a courtyard lit by crimson torches. Hooded figures appear, each with an armful of books, their shadows looming on the walls. They throw their load in a ring around his feet. Going back and forth, they soon bury him in books up to his neck. He strains to read a few titles, to deduce an author from a few lines of text. As each armful falls on the pile, a faceless figure asks whether he will renounce his heresy and all the works spawned by godless pride. He remains silent, eyes fixed on the books. And then a figure steps forward, holding a torch, face scourged by the flame.

- For the last time, will you renounce these Satanic texts?

Instead of replying, he strains to read an open text as though it were his very salvation. Lagrange's *Reflections on the Solution of Algebraic Equations*. He reads a section aloud, chants it as though it were a prayer, a source of courage to face the end without flinching, without renouncing his faith.

- If a function $f(x_1, x_2, x_3, \dots, x_n)$ of the roots of the general equation of degree n admits all the permutations of the x_i that another function $g(x_1, x_2, x_3, \dots, x_n)$ admits (and possibly other permutations that g does not admit), then the function f can be expressed rationally in terms of g and the coefficients of the general equation of degree n .

The torch is lowered, and he chants with greater fervour in the inquisitor's face. The crisp pages of Euclid's *Elements* begin crackling, curling, cuddling the flame. In an instant a conflagration springs up around him. Liberated from skeletal lines, geometrical figures dance as pure forms; seared from attachment to things, numbers swirl in the lightness of being; overcoming the gravity of paper and ink, the spirit of mathematics rises from its crucifixion to x . The youth's flesh peels away, and he fuses with the spirit of mathematics, ascends to paradise on wings of flame.

The dreams and fantasies of youth!

{The last application of the theory of equations is relative to the modular equations of elliptic functions.}

After a week of asceticism i felt lethargic, unable to work on the quintic with my former concentration. It was a Sunday afternoon, and the sky had been scoured by the harsh sun. i was sitting under the leafy elm, gazing at a pair of pigeons crooning on the school's chapel. Two students approached me, laughing, gesturing excitedly. Coming, asked a face covered in ripe pimples. i was overdoing it, said the other. i needed to get out of my skull for an afternoon. They were going to Monmartre, to hear a few speakers. Would i join them? They knew where my sympathy lay - i was a Republican at heart. i walked away as though they weren't there. The long corridor was cool and quiet. The old janitor limped from the other end, with a few sooty flues on his shoulder.

- Thank God for summer, he said, exposing a few brown teeth.

The library was empty. The afternoon light brightened the otherwise dark furniture, revealing the grain's flow, names and dates scratched over the years, knots like eyes in pain. The scent of white roses on the librarian's table dispelled some of the mustiness in the room. Unable to concentrate on the theory of equations, i took Pascal's *Pensees* and sat in the back corner. Before i had read a paragraph, drowsiness pulled at my eyes. A man was sitting on a small casket, bowed to a thick book on his knees, profile framed by a hexagonal window, hawkish nose exaggerated by the absence of background. Carrying a shovelful of ash, i approached the pensive figure. He looked up with visible strain, closed his forefinger in the book, and presses it to his chest.

- Don't be fooled, Evariste, he said in a voice weakened by chronic illness. It's the work of the devil: avoid it if you care about your immortal soul.

Grimacing, he stood, opened the casket, and invited me to look inside. It was his calculating machine, he frowned. He regretted having constructed it. But he was young at the time, seventeen or eighteen, flushed with pride and confidence. Beware, he warned. Youth was the devil's domain. What good lay in those cogs, spindles, numbered dials? Did the machine make us more tolerant of each other? Did it promote the spirit of the Gospels? Did it bring us closer to God? No. It facilitated the proliferation of commodities and the calculation

of profits. It separated man from nature, man from man, man from God. In time to come, it would spawn countless machines. They would process a million digits in a millionth of a second, take the drudgery from all kinds of work, make life more comfortable, make man master of the earth. And where was the harm in that? Surely, if the machine helped to alleviate the suffering of even one child, then it would have more than justified its existence. No. *i* shouldn't be deceived. The devil cogitated behind appearances, working through the machine, seducing souls by its apparent magic. The machine would always lack a soul, and that was the reason it seduced the souls of others. Depriving others of their soul, it sought to become god of the soulless.

- Is it you, Blaise?

He nodded, head barely moving, stringy hair slipping from his shoulders. He closed the casket and lay the book on it. Careful not to spill any ash, *i* took a few hesitant steps toward him.

- Why, Blaise? You could've been one of the greatest mathematicians of all time. You would've discovered the calculus before Newton. You were came so close in your Treatise on the Sines of a Quadrant of a Circle. Why?

He unbuttoned his vest, unstitched the lining that had been crookedly sown, and took out a piece of parchment, which he slowly unfolded and read aloud. The year of grace 1654. Monday, 23 November. Eve of Saint Chrysogonus, Martyr and others. From half-past ten to half-past midnight. Fire. Certainty, certainty. Heartfelt joy. Peace. God of Jesus Christ. The world renounced, and everything except God. I have cut myself off from Him. Let me never be cut off from Him again. Sweet and total renunciation. Everlasting joy as recompense for one day's effort on earth. Amen. Carefully keeping to the same creases, he quartered the crackling sheet and slipped it back into the lining. Yes, he had also lived and breathed mathematics. His mind had glowed white hot. He couldn't imagine an experience more fulfilling than that of mathematical discovery. He believed that he was serving the absolute truth, but he had been deceived, led astray by pride and vanity. Those two hours on that November night opened his eyes. He saw the truth in a blinding flash, experienced it, felt it with his entire being, as though he were enveloped by a fire, but a fire that didn't burn, a fire that was pure light. And when the flames released him, what he had considered the truth paled into insignificance. The physical world, his books, Blaise Pascal - all that dissolved. He was filled with inexhaustible faith, with a truth that satisfied him fully, that felt like overwhelming love. He felt complete. How could he put it to me? In those two hours it was as if he had proved Fermat's conjecture, solved all possible equations, found the ultimate prime, followed numbers to the end and returned to zero. But even that couldn't convey the sense of completeness and peace emanating from submission to Christ: a submission that promised eternal life through the salvation of the soul. He knew what *i* was going through at the moment, therefore *i* should take his advice and renounce mathematics before it aroused in me a perverse passion that would sap my youth and destroy my soul. In the end mathematics was nothing more than diversion: a means of keeping the mind from death and God. One may know the properties of all conics, the beauty of all cycloids, the sublime virtues of tautochrones, and yet this was of no help when one suffered, when one confronted one's own night of Gethsemane.

- Enough! *i* shouted.

He came toward me, but stopped when *i* extended the shovel.

- Renounce mathematics? Never!

He stared at me for a moment, then returned to the casket and opened his book. Sprinkling ash from the shovel, *i* enclosed the hunched figure in a powdery equilateral

triangle. Placing the shovel on my shoulder, *i* turned to go, but the shovel became so heavy *i* couldn't take a step, and *i* woke with a start to the librarian's hand was on my shoulder.

- Here on such an afternoon? he asked.

The sudden movement made me dizzy and *i* steadied myself on the table. *i* ought to be out there, he said, indicating the courtyard with a thrust of his forefinger. Picking up Pascal's book, he opened it at random and read aloud. One added to infinity did not increase it at all. In fact, the finite was annihilated in the presence of the infinite and became pure nothingness. So the human mind before God. A sharp pain struck at my left temple - that was my last day as an ascetic.

{We know that the group of the equation which has for its roots the sines of the amplitude of the $p^3 - 1$ divisions of a period is the following:}

i looked up from the memoir Poisson rejected. The bell was striking again - the last three sent a shiver through me. How many times had it tolled? Six? Seven? Twilight filled the room. My papers were scattered on the table. What had *i* been doing? Scribbling on the backs of my manuscripts, in the margins, over the work itself. A sketch of a grotesque face with hair swept off his forehead in a wave, a long upturned nose, a beard, and wearing female shoes. Above this figure, my name, beside it words scribbled and obliterated, which *i* now couldn't decipher. On another page, amongst the mathematics, *i* wrote the words 'Pistol' and 'Herbinville' - the last few letters of his name faint, trailing away to a thin tail.

Gathering the papers in a pile, *i* thought of burning them. The liberating flame would restore inspiration to inspiration, return ash to ash. But a feeling for my former hopes and dreams checked this impulse. The real Evariste Galois existed in there, among the proofs, theorems, propositions - the Galois of uncompromising idealism, who would never have fallen for a woman, whose spirit was as pure as mathematics. And the person now holding the quill, with a scar on the back of his hand from a childhood accident? *i* was nothing compared to the flashes of insight in these papers. Maybe *i* had to die for the real Evariste Galois to be set free. But how was the real Galois to be saved from extinction? The question jolted me. *i* would have to bequeath these memoirs to someone who believed in my work, who would bring them to the attention of a capable mathematician. Auguste! *i* should send everything to him with a short note. Hope - it was more tenacious than reason. No! Forget Auguste. Live without hope for another twelve hours.

{ $x_{k,l}, x_{ak+bl, ck+dl}$; consequently the corresponding modular equation has for its group $x_{\frac{k}{l}}, x_{\frac{ak+bl}{ck+dl}}$, in which $\frac{k}{l}$ may have the $p+1$ values $\infty, 0, 1, 2, \dots, p-1$.}

What was *i* going to do now, Chevalier asked, as we strolled through the winter shadows along the Champs Elysees. A few well-dressed children were exploding crackers by pulling on a silk ribbon: left-overs from New Year's Eve party games. The crisp air was spiced with gunpowder. Two boys aimed the crackers at each other and pulled the ribbon.

- You're dead, shouted one.

- No, you are, protested the other.

And they ran off, brushing past me.

- Louis Philippe will pay dearly, *i* spat.

He advised me to think of my future. Should *i* join his Saint-Simonists, *i* scoffed. Take up residence with Enfantin? Enjoy the pleasures of free love? The way to the spirit through the excesses of the flesh - wasn't that what his leaders advocated? There was more to Saint-Simon than Enfantin's subjective interpretation of him, he protested. Many of my Republican publicists had adopted Saint-Simon's ideas. We didn't say a word for a while, winter twigs crackling under our steps.

- What's happening at school? *i* asked.

- Have you seen the latest issue of the *Gazette*?

- *i* haven't read a thing since my expulsion.

- It contains a letter signed by the majority of students, refuting your account of what happened last July. They support Guigniault's actions in closing the gates, and his decision to expel you.

- Cowards! They'd lick his boots.

i pulled up my large collars against the chilly brilliance. A carriage with a line of horsemen on both sides came toward us. Men tipped their hats, women waved embroidered handkerchiefs, children run noisily. Here and there people muttered about the rising price of food. Words vaporised, fused, rose as a single complaint. Inside the carriage, a head with rosy cheeks and mutton-chop whiskers acknowledged the crowd. The Citizen-King was out among his people, *i* said, clutching a warm knife in the pocket of my overcoat.

- Louis-Philippe's more popular than Charles, Chevalier observed.

Holding him by the elbow, *i* whispered that, at that instant, one overweight, puffy-faced individual stood between us and the Republic. A moment's daring, and...

- And you'll never see your Republic.

- Moses didn't get to see the Promised Land either.

- Stop talking nonsense, Evariste. Use your head for mathematics!

- Dear, Auguste, voice of reason. Haven't you heard? Reason is unfashionable. Out with order, let chaos rule. Romanticism and Revolution: isn't that what our poets are writing? Our painters depicting? Our dramatists staging?

- Listen, Evariste, you're no longer a student or an Artilleryman - do something useful with your time.

- What do you propose?

He suggested *i* might give a series of public lectures on my mathematical work. *i* laughed. He wasn't joking - he would help me organise them. His brother was editor of the influential Saint-Simon paper *The Globe*. We could advertise without charge. Evariste Galois, mathematician, would present six lectures dealing with his investigations into algebra and his theory of equations. How did it sound? The advertisement might arouse the interest of a capable mathematician, someone who might study my findings, see their worth, and become my supporter, even a patron. What did *i* say? Was *i* interested?

Another cavalcade thundered past, with cannons hitched to horses snorting out clouds of vapour. *i* stared into the mouth of a receding cannon: it was the source of the ultimate zero, a concentration of darkness that destroyed for the sake of creating a new order.

{Thus, by agreeing that k may be infinite, we may write simply

$$\left. x_k, x_{\frac{ak+b}{ck+d}} \right\}$$

A week later we entered Caillot's bookshop on the Rue de Sorbonne. Small, with low ceilings and grilled windows, the front room was crammed with books and thick with the

odour of mould. Books strained the shelves touching the ceiling, they were piled on the counter, they covered the floor in precarious towers. The smell reminded me of my childhood: autumn days in an oak grove not far from home, where the leaves lay damp and dark. *i* would always return from the grove with a sense of foreboding: a melancholy which not even father's joviality could dispel. And now, stepping carefully between towers of books, *i* felt that melancholy stirring again. If it wasn't for Chevalier, *i* would have left the shop. Better the stink of an open sewer than the haunting smell of mouldy pages.--

i picked up a book from a row placed spine-up on the bench: *A Body of Work* by Mathos Chepin. The yellow pages breathed over my face as *i* flicked through them. It was an historical novel, set in Macedonia, printed in 1807, probably at the author's expense, for there was no imprint. What did the author hope for in writing such a book? Fame? Wealth? A literary career? Nothing of the sort happened: the book had obviously failed, and the author had probably turned to other things. What if this was the last copy in existence? Mortified by the book's dismal reception, perhaps the author retrieved the other copies, bought back those he had already sold, and set them all alight. Humiliated by the experience, perhaps he threw himself into the bonfire, taking the manuscript with him. If this was now the last copy, what would happen to *A Body of Work* if *i* threw it in the stove wheezing in the corner. Would that obliterate *A Body of Work*? Or would it somehow still exist, maybe in an ideal state, by virtue of the fact that it had been thought into existence? Two hundred years from now another author might pick up the ideas and write the same novel, perhaps in a different language. And what of Chepin? Would he be raised from oblivion by the second author? Could the man's emotions, temperament, intellect be recovered from the rewritten *A Body of Work*? And me? If *i* were to die tomorrow, could my life be reconstructed from my mathematical work alone? No, unlike words, mathematical symbols excluded personality. Perhaps in two hundred years my work might be studied universally, while my life could well be a blank?

A plump woman emerged from the back of the shop, supporting an armful of books with her fleshy chin.

- Yes, gentlemen, she heaved.

And she raised the books onto the counter, they spilled from her smothering embrace, as though they were infants who, amply fed and warmed, broke loose. Books, she exclaimed, sweeping her arm. And they continued to pour out of printing shops, she scowled. A deluge each day. She had nightmares in which she saw herself drowning in an ocean of books, an ocean black from ink. Just look around, she complained. Up to her neck in them. Not enough space to stand in, and that husband of hers kept buying them by the cartload. He was obsessed with them. And did we think they were able to sell them? Of course not! We were living in hard times: people couldn't afford bread, let alone books. They were facing bankruptcy, and there was no stopping her husband's ruinous passion. He was out day and night, scouring flea-markets or buying the libraries of deceased estates, while she was left here, in the gloom of this burial crypt for failed writers, trying to make ends meet.

Chevalier tried to interrupt her, but her torrent of words continued, pouring from the fleshy sack under her chin. We exchanged glances and waited for the flow to take its course. Were we poets, she asked? Novelists? Beware. She picked up two thick volumes and clapped them together, sending up a cloud of dust. That was how her husband's troubles began. At our age he had also wanted to be a writer, but his want was greater than his ability. When the truth finally hit him, he got it into his head that if he couldn't write books, he would do the next best thing - collect and sell them! From that time on, he had been a guardian of books, their foster-father, bringing in every ragged, battered, water-stained orphan he could find, giving each one shelter, warmth, care - all without a thought for whether they could repay his

kindness. She shook her head, and her fleshy throat trembled.

- We're not poets, *i* interjected. We're mathematicians.

Yes, mathematics, by all means, she grinned, her lower jaw protruding beyond her upper, revealing two yellow canine teeth. Up there, on the top shelf. Could she interest us in Euclid? All thirteen books in five leather-bound volumes. Genuine calf-skin. Mint condition. The Greek original facing the French translation. With pages of commentaries. Ours for a mere seven francs. A steal for such classics. She had flicked through a few before shelving them the other day. Beautiful, even though she knew nothing about geometry. Two thousand years old, and still relevant. It took real genius to write books like that. Poetry and fiction? Bah! Any hack could scratch a fifth-rate novel or a collection of verse. And the result? Piles of rubbish! Every hack imagined he was a genius and that his work was an inspired masterpiece. Inspired! The only thing it inspired was a dying flame.

- We're here for the back room, madam. My brother, Michel Chevalier, arranged it with monsieur Caillot last week.

Perplexed for a moment, she turned from Chevalier to me, examined us from head to toe, then instructed us to follow her. A door lined with shelves opened to a room already prepared with rows of chairs and a blackboard mounted on a tripod. Piles of books stood against the four walls. Another stove hissed in the corner.

- The room's to be used for mathematics, she huffed.

- Stay and listen, said Auguste.

- No politics. Nothing subversive. Understood?

The front bell tingled frequently in the next half hour, and by six o'clock about twenty people had arrived. There were a few friends from the Artillery, including d'Herbinville, whose presence both surprised and flattered me. Was he interested in mathematics or had he come from Republican sentiment? Several students from the Preparatory School. Sturm and a Russian called Ostrogradski. *i* had discussed my work with Sturm. One of the editors of *Ferussac's Bulletin*, he had published a few of my articles.

{By giving to a, b, c, d all the values, we obtain $(p + 1)p(p - 1)$ permutations.}

Thinking about Sturm, *i* now feel ashamed at having deceived Leroy, the mathematics teacher at the Preparatory School. Reading from a sheet of paper, he wrote the word Theorem on the blackboard and proceeded to copy what he said was a new discovery in algebra made by a Swiss mathematician living in Paris called Sturm. He went on to point out the usefulness of the Theorem, but said that a proof involved a level of algebra beyond our scope. *i* despised this teacher because of the way he strutted around the room, using mathematics as a weapon to brow-beat and humiliate students. *i* seized the moment.

- Some of us would like to see the proof, sir.

- It's too detailed, he replied.

A whisper buzzed around the room as the students sensed a confrontation.

- We'd like to study it.

Leroy reddened. Shuffling a few papers on his desk, he ordered me to sit down, saying that if he spent time proving the theorem it would result in them falling behind in the syllabus. It wasn't that detailed, *i* persisted. It could be demonstrated in a few minutes. Enough, he ordered. Some whispered that *i* had already worked out the proof in my head, and that Leroy's reluctance was due to his not knowing it. Others were saying that *i* was just showing off, that *i* didn't know the proof. Encouraged by the whispers, *i* maintained the attack on the now crimson-faced teacher. The proof would be most helpful. It would enhance our

appreciation of the formal beauty of algebra. Unless, of course, he was unable to do remember it, in which case *i* would be more than happy to demonstrate it. He relented and extended a stick of chalk, saying that he knew exactly what it entailed, so *i* had better get it right. Erasing the sunlit blackboard, *i* stood on my toes to reach the top and proceeded with the proof, occasionally grating the chalk. When *i* finished *i* struck a pointed full-stop, placed the chalk on the table, and clapped the dust from my palms. The whispers had now grown to excited chatter. Leroy stood with arms crossed, forehead shining with perspiration, nodding at the proof.

- Very good, Galois, he finally drawled. You'd be a fine mathematician if you weren't so haughty.

Several students applauded. Leroy wiped his bushy brows, which now drooped lower, almost concealing his eyes. As he reached for the eraser, *i* snatched it from the table and turned to the blackboard. *i* had made an obvious mistake, *i* said, wiping a line and inserting another. That was how the proof should be, wasn't it, monsieur Leroy?

i haven't told anyone, not even Chevalier: *i* didn't deduce the proof there and then. *i* had seen both the theorem and its proof weeks earlier, at a meeting with Sturm. *i* regret the incident now. Like Leroy, *i* debased mathematics and used it to brow-beat him.

{Now this group decomposes *properly* in two sets, whose substitutions are $x_k, x_{\frac{ak+b}{ck+d}}$, $ad - bc$ being a quadratic residue of p .}

d'Herbinville winked in encouragement as *i* took a few sheets from a satchel that had belonged to father. My confidence in public speaking had increased since joining the Society, where *i* had made several speeches outlining how best to organise and mobilise students. Standing in front of the blackboard, *i* nodded to madame Caillot: she was in the doorway, thick arms crossed at the wrist, ready to bark at anything subversive.

i began by pointing out that the lectures over the next six weeks would deal with my investigations in the field of analysis, in particular, my researches into the theory of equations and integral functions. Before presenting the technical aspects of my work, *i* wanted it known that when my work eventually appeared in book form, it would not contain the name of any wealthy patron or distinguished member of the scientific community - names in big bold letters that dwarfed the text itself. *i* had received no assistance from influential people; on the contrary, those in a position to help had thwarted me at every step. It was no accident my manuscripts had been lost by the honoured members of the Academy. *i* had expected better from them, considering they were responsible for Abel's death. But enough of grievances.

In turning the page, *i* glanced at a fellow who had just entered and occupied a back seat. *i* had never seen him before: he was about fifty, respectably dressed, with the pale complexion of one who spends a great deal of time indoors.

Progress in mathematics had not been due to our facility to perform lengthy algebraic calculations. With the work of Euler, who in a sense invented a new language, progress had been made through terse, precise exposition. In the last thirty years the algorithm, the machine for working out results, had become so complex that it practically precluded any real advancement by such means. If we were to deduce anything from the fact that terseness and elegance were the avowed aims of most advanced mathematicians, then surely it was this: the creative, innovative mathematician was concerned with grasping several concepts at once, rather than stopping to look at particular details. But even the simplifications produced by terseness and elegance had their limits. The time would come when algebraic transformations

foreseen by analysts could not be easily produced because they would require too much time. And here *i* elaborated on what *i* meant by the word foreseen. Future creative mathematicians would move forward through intuitive leaps, just as society moved forward through revolution.

Feet shuffled, chairs creaked. Madame Caillot, who had been coming and going, glared at me from the doorway, her lower jaw protruding. Chevalier filled a glass with water for me.

My words now more fervent, *i* put aside my notes. We were seeing the evolution of a new sensibility, *i* said. A higher consciousness. The signs were everywhere. The marble reason of Classicism was being challenged by the spirit of Romanticism. Look at Hugo. The preface to his play *Cromwell* outlined the new spirit. The poetry in his play *Hernani* was worlds away from Racine and Moliere. His language moved by emotional leaps which left reason behind. Perhaps in twenty or thirty years a poet would emerge, someone of my age, whose poetry would be more daring than Hugo's, who would leap in great arcs over reason, whose expression would be terse, concentrated, proceeding through a series of images moved by subtle allusions, associations, intuition. And how had Romanticism affected mathematics? Didn't mathematics arise from evolution, not revolution? From reason, not intuition? No! Intuition led, leapt from peak to peak, while reason followed behind, filling in the gaps, making the associations, constructing the bridges which enabled mankind to move forward. Mathematics didn't move smoothly, it never integrated past and present. More often than not it advanced through radical, revolutionary ideas.

Madame Caillot thumped two books against each other.

Pacing before the blackboard, *i* reminded them the ancient Greeks were horrified when the concept of an irrational number began infiltrating their ordered world. Without precedent for such numbers, their beliefs were challenged and undermined. Opposition to these subversive entities was so strong, people were killed for daring to utter them. In recent times the same outrage had greeted the appearance of imaginary numbers. Gauss had put it well: the true meaning of the square root of negative one was vivid in his mind, though he still found it difficult to express that meaning in words. That was precisely what *i* meant by the word foreseen: intuition, that for which the present lacked an appropriate vocabulary. But just as the irrationals extended the scope of arithmetic, the imaginaries extended the scope of algebra, and the fundamental theorem of calculus was defined in terms of these imaginaries. Another example of the revolutionary nature of mathematics was the work of the Russian Lobachevsky. He had challenged Euclid's parallel line postulate and proposed a new geometry, in which parallel lines met and the three angles of a triangle did not sum to 180 degrees. Here was Romantic mathematics breaking Classical geometry - revolution at work.

Feet scraped, chairs creaked, d'Herbinville, fashionably dressed as usual, crossed his legs, careful not to spoil the crease in his trousers.

My work also proceeded from this tendency to think intuitively. Dispensing with details, *i* leapt from one new idea to another. True, worthwhile things would continue to emerge from analysis in the old way, but discoveries would be few and far between, and mathematics would suffer from stagnation and eventual exhaustion. *i* smashed through the constraints of algorithms and calculations, grasped and grouped operations, classified them according to their difficulty and not according to the deceptions of form. My method shouldn't be confused with that of people who avoided calculations, only to express themselves in a lengthy, pompous manner, when terse algebra would have served their purpose. *i* proposed an analysis of mathematical analysis: a new, terser algebra, where the most elevated calculations would be considered as nothing more than particular cases, and so

trivial beside the far more general investigations. There would be no lack of people to carry out the calculations envisaged by the new analysis. Just as the visions of prophets were the seeds cultivated by generations of theologians, so my approach would be used by generations of mathematicians not only to solve particular problems, but to advance new theories.

{The group thus simplified has $\frac{(p+1)p(p-1)}{2}$ permutations.}

My researches had concentrated on determining whether an equation could be solved by radicals - a process that required only the operations of arithmetic and the extraction of roots. The cubic and quartic were solved by using transformations to reduce them to combinations of linear and quadratic equations. The general quintic resisted attempts to reduce it to simpler equations, until Abel showed, using an algebraic proof by contradiction, that it could not be reduced, hence it could not be solved by radicals. *i* had taken Abel's finding further. My theory was more general: it enabled one to look at a particular quintic and say whether it could be solved by radicals, for we knew that there were countless quintics which could be solved in this manner. In fact, when applied to the general quintic my theory validated Abel's finding.

Here, *i* digressed for a moment in a kind of self-defence. Historians of mathematics would assert *i* owed a great deal to Abel. Perhaps an eager scholar would complete a doctorate arguing that my work was based on a close study of Abel. But *i* wanted it known that *i* was unaware of Abel's work when *i* had made my first discoveries in this area. Furthermore, a careful reading of Abel's paper on the quintic makes it obvious that our approaches were completely different. He used algebra and long calculations of the sort *i* had been arguing against. My approach, on the other hand, was based on the idea of a group. Sturm and Ostrogradski exchanged whispers. The Russian twisted the end of his long beard. Every equation had a group, *i* continued. A characteristic of an equation that satisfied a set of criteria. Now once the group of an equation had been determined, the nature of this group would reveal whether the equation could be solved by radicals. In this regard, the group was to the equation what the equation was to the trajectory of a cannon ball. Just as an equation enabled one to determine the ball's maximum height and range before lighting the fuse, so a group was an equation of an equation - what *i* had referred to earlier as analysis of analysis. *i* didn't have time to apply my theory of groups to areas other than equations, but *i* was certain it had wider applications. Perhaps wherever there was a situation that denied the mind direct access, groups might be used to model that situation and provide valuable insights. The theory of groups might well provide a key to unlocking the secret of the universe - to solve the universe's central mystery, or conclude that it had no solution.

After the lecture, a few people congratulated me: they had found the material stimulating and looked forward to next week's talk. d'Herbinville grasped my hand and expressed surprise at my talent. He wished me well, adding he hoped *i* could accommodate both mathematics and the Republic. Having erased the symbols from the blackboard, madame Caillot was now doing some arithmetical calculations. As Chevalier and *i* went to the door, the fellow who had arrived late approached us and thrust a plump hand toward me.

- I'm impressed, young man.

- Are you a mathematician, monsieur? asked Chevalier.

He smiled and smoothed his thinning hair. Years ago he had come to Paris to study the subject at his father's insistence. In those days he was caught between a love of algebra and a passion for letters. In the end literature prevailed, though he had still managed to

maintain an interest in mathematics. Disappointed, *i* asked whether he was a writer. A novelist. In fact, *i* reminded him of the protagonist in a novel he had published last year.

- Your name, monsieur? Chevalier enquired.

- Beyle, Henri Beyle.

- And the title of your novel?

It wasn't well known, he smiled, reddening a little, but he was certain it would be read in a hundred years from now, while many of today's popular works would disappear without trace. What made him so sure, *i* asked. The very thing *i* had mentioned in my talk, he replied - intuition. As for his name, he hoped it would die before his body. In fact, he wrote under a pseudonym, the quicker to separate the man from the writer, the body from the spirit of the word. Picking a large moth from behind a pile of books, madame Caillot held the shuddering insect by one wing, rattled the stove and dropped it inside. A button was hanging by a thread on Beyle's bulging vest: it would fall before the night was out, *i* thought. As he walked along a dark street, it would fall and roll into the gutter without him hearing it. *i* was tempted to reach out, pluck it from the vest and hand it to him. Brushing soot and chalk-dust from her hands, madame Caillot approached us and said she had to close the shop. As we walked through the maze in the front room, Beyle accidentally elbowed a tower of books - it fell onto another tower, and this onto a third. In a few seconds the floor was covered in books and madame Caillot was hissing abuse at her husband.

{But it is easy to see that it is not further properly decomposable, unless $p=2$ or $p=3$.}

Home for the summer holidays, *i* avoided family members as much as possible. The cottage in grandfather's almond grove was quiet and out of the way - a place where *i* could concentrate on my work, maybe find the solution to the general quintic before returning to school. But first, yet again, *i* had to explain my poor results to father. A light breeze stirred the lace curtain, whose shadow was like a net thrown over him hunched at his desk. As he read my report, *i* tried to decipher the lines creasing his forehead.

- No sign of progress, he said in a flat tone.

Why couldn't *i* talk to him? Feel comfortable in his presence? Relate to him as *i* had before going to Paris? It seemed that a chasm of silence had opened between us, and it was widening, though not so much from differences of opinion as from our respective inner preoccupations. Even now he lapsed into thoughtfulness, twisting his cravat. My final year was coming up. He looked tired, his words fell away with what sounded like indifference. What would *i* study? Advanced mathematics. *i* couldn't get away from the subject, could *i*?

- It's my life, father.

We would talk again tomorrow, he said, picking up the paper knife. He stood and paced in front of grandfather's portrait, whose hand was spread on a pile of books as though taking an oath. As *i* opened the door, he called me back and embraced me with a sad look.

- Are you all right, *i* asked?

- They're trying to destroy me.

He went to the desk, took out a folded sheet and handed it to me. It contained a few verses of doggerel ridiculing members of mother's family. His enemies had attributed that piece of rubbish to him. They were now trying to turn mother's side of the family against him! But he knew the person behind this slander - the priest. Uncle had received the letter anonymously. He was naturally furious, demanded an explanation or a duel. Father had assured him that he wasn't the author of the perfidious poem, that someone had used the

letterhead of his office and forged his name in order to drive a wedge between the two families. Uncle had shouted that father's ability to write rhymed couplets was well known. Father insisted it wasn't his work, and that if he had wanted to denigrate anyone he would have done it with more flair and originality than the mischievous hack who wrote that. And he pointed out to uncle that he had never used iambic tetrameters with feminine rhymes - his couplets were always dactylic hexameters with masculine rhymes. It took half an hour of prosody to calm him down, and even then he had left unconvinced.

The floorboards squealed under his steps. How could *i* help him? *i* felt powerless, inadequate in everything except mathematics. *i* loved him more than anybody, but love demanded sacrifices. Should *i* take up his fight? Renounce my interests for his well-being? Mathematics or politics? But *i* disliked people, groups, crowds. If *i* threw myself into the chaos of social and political life *i* would be swept aside, overwhelmed, rendered useless both to him and myself. The quintic! That was how *i* could best help him. Solve the quintic, enter the Polytechnic, bring honour to the Galois name, and, through that, defeat his enemies.

Not only this, he continued, rotating the knife so that it flashed when grazed by the sunlight. They were now also accusing him of having used public money to re-roof our boarding school. Life-long friends were questioning his honesty. He had given fifteen years of public service, improved the town for everyone, and now people were turning away from him, believing the lies of that vengeful Jesuit. As though an inner prop had suddenly collapsed, his shoulders stooped, his head dropped, his gaze fell on the knife's blunt blade. The breeze parted the curtains and a black butterfly entered the study, stopped on the inkpot, then flew raggedly to grandfather's portrait, where it disappeared in the dark background. Feeling a swell of emotion, *i* offered to help him. There was no telling how things would develop, he said, calling me son. Whatever happened, he wanted me to know that he had always acted honestly, guided by a sense of justice and equality.

The next few days passed quietly, with each member of the family absorbed by their own concerns. Even at meal times, there was more clatter than conversation. *i* had done my best to avoid mother, though her pressed lips and rigid jawline indicated that she was determined to talk to me.

Nathalie was preoccupied with fashion and her fiance. As for Alfred, he shied away from me, or met me with a scowl, hurt not only by the fact that *i* wouldn't help him get to Paris, but also by what he considered my deliberate silence on political matters, for he was certain *i* was a member of a secret student group with Republican and revolutionary ideals.

Grandfather's cottage in the almond had proved a haven. One afternoon, my bag packed with paper, ink and a few texts, *i* was leaving the house for more intense work on the quintic, when Nathalie called me into the dining room. She was setting cups and saucers on the table. Her fiance was due shortly, and she wanted us to meet. *i* nodded, though inwardly chaffing at the imposition. A knock at the door, and her face beamed. She directed me to the chair beside the clock, examined herself in the mirror, skewered a springy curl with a long pin, and ran from the room with a sprightly step. She was happy and in love, *i* reflected, staring at a blaze of roses set in the fireplace. Happiness? Love? Would *i* ever fall in love? No - those who devoted themselves to mathematics couldn't be distracted by love. The mind was vast and eternal, the body weak and mortal. Ten lifetimes weren't enough to explore the labyrinths of mathematics and bring to light new thoughts and theorems. Would *i* ever be happy? When had *i* last been happy? Not in the four years at Louis-le-Grand. Would *i* find happiness at the Polytechnic? Yes, but it would be a different happiness from Nathalie's - a happiness in the knowledge that *i* was in the service of the Queen of the Sciences.

Cheeks flushed, she introduced her fiance and went to make coffee. Robust, with long

sideboards cut at a sharp angle, he sat opposite me and hooked his thumbs in the pockets of a yellow vest. *i* focused on a black knot in the floorboards. How long would this ordeal last? What was *i* studying, he asked disinterestedly, simply to make conversation. Could *i* make a living out of mathematics? He didn't even look at me in asking the question.

- *i* live for mathematics, *i* replied sharply.

- Here's one for you, he grinned. What's the sum of the first hundred numbers?

i was in no mood for party tricks. *i* disliked the fellow's posturing: it was obvious he had never opened a text book, and here he was trying to be a know-all. Ignoring his question, *i* stared at the room swaying in the clock's silver disc.

- 5050, he announced with a laugh.

Irritated by the way he tapped the floor with the heel of his fashionable boot, *i* was about to retaliate with a question from advanced algebra, when Nathalie returned. They tried to draw me into their gossip, but *i* resented their patronising manner, and made curt replies. Nathalie darted a few pointed looks. They were both happy and in love. What exactly did they see in each other that made them happy? Their conversation was meaningless small talk, and yet they carried on as though it was of utmost importance. No! *i* would never fall in love, never waste precious time courting a woman.

Later that afternoon *i* returned from the cottage feeling buoyant at having made definite progress toward solving the quintic. Mother was reading on a bench under an oak tree. Wanting to avoid a sermon sure to dampen my spirits, *i* turned and headed for the back of the house. She called. *i* walked on, but she called again, with a sharp edge to her voice.

- You've been avoiding me, she frowned.

The Bible was open, face down on her lap.

- Sit down for a moment.

Using an oak leaf as a book mark, she closed the Bible. *i* sat on the edge and wrapped my arms around my bag, as if protecting my work on the quintic. A crow called from the depths of the tree.

- Where have you been?

- What do you want, mother?

- My son, she snapped.

- Here *i* am.

Would *i* help her, she pleaded, seizing me by the wrist. Father wasn't well. His behaviour had become strange. He hardly spoke to her and spent most of his time alone in the study, deep in thought. When he did speak, it was always the same: he complained of being persecuted. He saw a priest in every shadow and accused her of conspiring with his political opponents to bring about his downfall. *i* was the only person who might be able to help him. *i* must tell him not to fight the Church, that salvation lies in Christ, not in false prophets like Napoleon.

- My salvation's neither Christ nor Napoleon, *i* said, springing up.

- Evariste! Come back!

{Thus, in whatever manner we transform the equation, its group will always have the same number of substitutions. But it is interesting to know whether the degree can be lowered.}

Seventeen, a toothless old vendor had cried in the town square, pouring a scoopful of onions into a customer's sack, and now the word echoed in my ears as *i* strolled through the countryside on my way to the cottage. The number or the word - what had been first? In

the beginning was the Word, and the Word was God. Yes, but God was also the indivisible One, from which it followed that number was the source of creation. Taken from the other end: God was infinite. How then could His infinite nature best be grasped? All the alphabets that would ever exist, could generate only a finite number of words, grammars, syntaxes; therefore, there would always be a substantial part of God beyond the grasp of words. Numbers, on the other hand, were infinite, and so of the very essence of God. When one considered the real numbers (let alone the imaginary, the transcendental, and all-those yet to be discovered), when one grouped them into naturals, integers, rationals, irrationals, when one saw that each group was infinite; and not only this, but that there were as many multiples of ten as natural numbers, and that between the natural numbers two and three there were an infinite number of rationals, and that between two rationals there was an irrational consisting of an infinite numbers of decimal places, then one had to acknowledge that numbers were the essence of God, for where could they be contained but in the mind of God. Yes, language and words could say 'From one to infinity', but if language attempted to name every natural number (leaving aside all the others), if it coined new prefixes for illions, and proposed new words for countless zeros, it would eventually exhaust itself and fall silent behind the great forward rush of numbers.

i turned off the main road, and followed a dusty uphill path between vineyards heavy with grapes. From the crest, *i* admired the coloured plots which quilted the plain surrounding the town. Here and there smoke rose leisurely from stubble burning. A river slithered through the countryside. On the hazy horizon, the steeples of Paris were just visible. A stone wall surrounded a cluster of almond trees. *i* shuffled through the thick shade, smiled at the scarecrow's ragged greeting, and went to the cottage crouching at the far corner of the enclosure. Birds scattered as *i* entered. Placing my bag on the stout table, *i* took out my books and writing equipment and bowed to the quintic. Unlike the other problems on which *i* had tested my talent, and which had proved beyond me, the quintic was difficult yet accessible. It was a labyrinth: a maze of tortuous routes, dilemmas, paths that lead to absurdity, paradox, dead ends. Within this maze of possibilities *i* had managed to find a few paths which seem promising. Now, hardly able to contain my excitement, *i* followed a path suggested by Lagrange, my quill twitching, scratching, struggling to keep up with my thoughts driven by the force of an irresistible logic.

i looked out the window: a vineyard shimmered under the midday sun. Numbers and nature. Natural numbers: 1, 2, 3... There was nothing else in nature. No negatives, no fractions, no irrationals. Nature provided bread and wine, while numbers provide...? A means of harnessing nature. They made it predictable, subjected it to man's will. Perhaps when Pascal's calculating machine became more advanced, performing a million calculations in a millionth of a second, then nature might be described by a system of equations, by the Grand Equation, which would predict everything from the death of a star to the fall of a vine leaf. And if *i* could find the solution to the quintic it would be an important step toward the Grand Equation.

Cicadas crackled around the cottage - it was already late-afternoon. A painter had set up an easel in a bare patch between two vineyards, and it appeared he was painting the grove and the cottage, not knowing *i* was inside. And if he should paint a masterpiece, *i* mused, that eventually found its way into a museum, future generations would gaze at the small stone cottage, not knowing that *i* was in there, working on a far greater masterpiece. He grasped nature by means of colour: the combinations of a few dozen colours were sufficient to represent nature. Yet colours were derived from nature, and this prevented painters from transcending nature. The signs and symbols of mathematics were not connected to nature -

they were almost ethereal entities. An x was like a pair of wings that enabled mathematicians to soar above the earth and see truths beyond the painter's grasp.

i worked effortlessly for the remainder of the afternoon, oblivious to everything around me, my thoughts one with algebra, my being one with the spirit of mathematics, until it appeared - an intuition almost too insubstantial for thought, a vision too evanescent for the senses, an idea almost too subtle to be grasped even with the symbols of algebra. It was the solution of the quintic - the proof of my worth, the very meaning of my life. -

{First it can be made less than p , as an equation of degree less than p cannot have p as a factor of the number of permutations of its group.}

Laughter sounded in the sanatorium's courtyard. i looked up from my thoughtless scribble over the manuscripts. Twilight was dying, turning to ash. i would soon have to light the lamp. What a mess! Mathematical symbols, words written and blacked out, a face - to my astonishment i saw that i had absent-mindedly sketched d'Herbinville's handsome profile. The coupling of the letters E and S might be a character from a future alphabet, a new sound, or a word in a language yet to evolve. The conjunction of an x and the numeral 1 might represent a cipher denoting an entire page of thought - a cipher in a language synthesised from mathematics and poetry. Time seemed to have stopped. Another twelve hours to kill, and nothing to do but wait and scribble meaningless symbols. What a pathetic figure i was at that instant: sitting there at the table, wearing the Artillery uniform, shuffling my hopes and dreams. i recalled Ajax, and suddenly i had to fight back an emotion that would have dissolved me in self-pity.

{Let us see then whether the equation of degree $p + 1$, whose roots are denoted by x_k on giving k all its values, including infinity, and which has for its group of substitutions $x_k, x_{\frac{ak+b}{ck+d}}$, $ad - bc$ being a square, can be lowered to degree p .}

i can almost hear the objections to this sentence: it should have been expressed more clearly. Yes, i ought to put a line through it and write it again, but with an hour left there's no time for major corrections. i only hope that Chevalier passes this onto a competent mathematician, someone able to edit and elucidate the parts which aren't immediately clear. So much depends on his finding a sympathetic mathematician. My discoveries are all in here, accessible to all who are prepared to enter my thoughts and devote time to a careful reading of my work. As for the others, the incompetent and the merely inquisitive, they should concentrate on literature.

{Now this can happen only if the group decomposes (improperly, of course) in p sets of $\frac{(p+1)(p-1)}{2}$ permutations each.}

The wind battered the white flag hoisted in the courtyard, rattled the elm's bare branches, lacerated itself on the Preparatory school's spiked gates. Arguing with Corbeau, a Royalist sympathiser, i could feel my anger rising as the exchange became more spiteful. A

few students had gathered to watch the proceedings. Dismissing me with an offensive hand gesture, Corbeau turned to his companion. He wouldn't waste his time on me, he laughed. The girls on the Champs Elysees were waiting for a little attention.

- Filthy Royalist! *i* shouted, buffeted by the wind.

Benard and Flaugergues restrained me. They shared my Republican views, and had come to the Preparatory from Louis-le-Grand. *i* had said more to them in the past two months than in five years at the other place. Corbeau advised them to take me away before *i* got hurt. *i* tore myself loose and lunged at him. Keeping his footing, he turned and fisted me in the mouth. *i* staggered, tasted blood. Before *i* could retaliate, Corbeau and his companion were out of the courtyard. My friends came to my assistance. Everything was blurred by tears. *i* left them without a word. In a sheltered corner of the courtyard, *i* lay on a bench, head back to stop the bleeding from a cut inside my upper lip. A few wispy clouds were like quills poised to fill the sky with mathematics. My lips throbbed: Where was the peace and order of mathematics? That world without blood and pain? During the past few months *i* had lost my former equanimity. My emotions seemed to be in constant turmoil, and *i* found it increasingly difficult to concentrate on my mathematical research. What had *i* done lately? Submitted an article titled An Analysis of a Memoir on the Algebraic Solution of Equations to Ferussac's Bulletin, and reworked two earlier memoirs which *i* combined as one and sent to the Academy for the Grand Prize in mathematics. But they weren't creative works: they didn't stir me. Would *i* ever be stirred again? Would *i* make another discovery like my theory of groups applied to equations? Mathematics? What was its relevance to the Revolution and the future Republic? And my theory of groups? Maybe that, better than anything, expressed the spirit of Revolution. My work might provide a model for the Republic. After all, Plato's Republic was based on mathematics. Maybe this would be my mission: to bring mathematics into the open, make it public, use it to impose order on chaos, justice on injustice, the eternal on the fleeting. A Republic where equality would be absolute as a mathematical equation; equality not in outward form but in essence, like $x^2 - 4 = (x+2)(x-2)$.

A shadow settled on my face. The sudden movement in sitting up sharpened the pain in my mouth, filled my eyes with tears. A student was standing a few steps away, arms folded, smiling faintly.

- What do you want? *i* asked, feeling with my tongue for blood.

- Did he hurt you?

We were together in a few classes, but had never spoken. He was short, plump, with black curly hair and a bad case of acne. He introduced himself as Auguste Chevalier, then sat down and explained in a lively voice that he shared my idealism, and had been impressed by my mathematical ability. Lacking talent, he managed to pass the subject through sheer hard work, but this hadn't weakened his belief that mathematics was the key to a new society. *i* had real talent, he said. The Republic would need scientists, in particular mathematicians. Society wouldn't be adversely affected if it suddenly lost the Royal family, the ministers of state, the hierarchy of judges, prefects, priests, the wealthy gentry who lived solely on income from property. They produced nothing to better the material quality of life. But everyone would be worse off if we lost our leading scientists and mathematicians. *i* was impressed by his words, sharp with conviction, his purposeful gestures, his steady gaze. Here was a kindred spirit: someone with whom *i* could share my ideas, who might make this place a little more bearable. *i* felt my front teeth - they were still firmly in place. He said the ideas were those of Saint-Simon and that he belonged to a group dedicated to realising a more just society based on his teachings. And his views on revolution, *i* asked. Saint-Simon believed that the only legacy of revolution was long-lasting hatreds and divisions.

- The Republic needs the cleansing fire of revolution.
- Reason, not passion. Lasting change can only be brought about through education.
- Is that why you're studying to become a teacher?
- Yes. To educate the poor.
- Then we both believe in equality.

His dark eyes gleamed with fervour and the wind ruffled his hair as he spoke of Saint-Simon's last book, *The New Christianity*, in which he taught that the spiritual and economic direction of society should come from men of science, not priests and politicians. In this mystical, prophetic book, he openly declared his belief in God, and insisted that a true Republic would only arise when the moral and material conditions of the poorest classes were significantly improved.

- Our ends are the same, *i* said. It's a question of means: education or revolution?

Saint-Simon had died five years ago, but his ideas had been taken up by Rodrigues, Enfantin, Bazard. Why didn't *i* come to one of their meetings? The members were mainly young, progressive intellectuals. There would be no compulsion to join. Who could tell, he smiled good-naturedly, *i* might discover that mathematics was the noblest means to a Republic.

My mouth throbbed, my lips felt swollen.

{Let 0 and ∞ be two conjoint letters of one of these groups. The substitutions which do not change 0 and ∞ are of the form x_k, x_{m^2k} }

The quintic! *i* had solved it! *i* gathered my things, closed the shutters and door, and leapt out into the evening spread with a blazing banner. *i* ran through the almond trees, past the spot where the painter had been, to the top of the hill, where *i* stopped to catch my breath. In the distance Paris was burning in a great conflagration, and flocks of rooks were screeching toward it from all directions.

i kept the pages with the solution in my breast pocket. They had transformed me: *i* now walked more upright, confronting the looks of those fashionable young men who pursued wealth, a position in society, a marriage that would provide a substantial dowry. They could have it all! *i* possessed something that neither wealth nor power could ever obtain: the solution to the quintic. Walking through the town square, *i* would slip my hand into my pocket and feel the textured pages - and that was enough to vanquish haughty looks and coquettish smiles. *i* had the solution - it would open the doors to the Polytechnic and to a place in posterity. Pascal had worn his testament in the lining of his vest until his death, *i* would sew the solution into my jacket and wear it like a talisman.

Returning home from wandering the countryside, where *i* savoured my discovery and indulged in reveries of the Polytechnic, *i* saw father sitting morosely under the oak. He didn't look up until *i* stood over him, and even then he accorded me a dark glance and focused his attention on the pebbles around the seat. *i* would be returning to school tomorrow, *i* said. The afternoon light slanting through the tree revealed the fine hairs on the rim of his ears.

- Are your holidays already over? he asked, surprised.

He brushed a few crisp leaves from the seat and moved aside. *i* sat in his warmth, and the pages rustled as *i* crossed my arms. Had *i* thought about things? Mathematics was my life. He nodded. Friends were questioning his integrity, and mother was siding with the priest. And as he asked for my help his head fell forward, as though the sinews in his neck had suddenly slackened. *i* was going to become a great mathematician, *i* said, moved by his

dejected look. *i* took out the pages and held them for him to see. They contained the solution of a problem which had baffled mathematicians for hundreds of years. *i* had solved it out yesterday.

- They're closing in on me, Evariste.

He looked at me sadly, searchingly. Mother appeared on the verandah and flapped a table-cloth, scattering a few starlings. Deftly folding and smoothing the cloth, she stared at us for a moment, then went inside.

i would dedicate my work to him, *i* said, springing up. His enemies wouldn't dare slander him when *i* entered the Polytechnic. The name Galois would take its place beside Pascal. My enthusiasm didn't light an ember in his ashen face - in fact, it darkened with disappointment. That wasn't the kind of help he had hoped for: he wanted me to say that *i* would complete my studies and return to help him with the boarding school. *i* couldn't possibly abandon my mathematics, not now that *i* had made this discovery. He nodded and took my hand - his was surprising cold. *i* remembered the Hamlet sketches we performed for visitors when *i* was a child and tears rose to my eyes. Unable to say a word, *i* put away the sheets and left. Glancing over my shoulder before entering the house, *i* saw a grey shadow fading in the darker shadow of the oak tree. If only *i* had known what would happen, *i* would have turned back from the house and led him out of the shadow. But how was *i* to foresee it - life isn't like mathematics.

Later that afternoon clouds brooded over the town and the smell of an approaching storm spiced the air. *i* was in my room packing when a faint knock sounded. Thunder rumbled in the distance. *i* walked toward father's winter overcoat which had been hanging from the door-hook all summer. Mother entered with a pile of pressed clothes and went to pack them in my bag.

- There's no need to...

- You'll wrinkle them, she insisted.

i stood at the open window. Stubble was being burnt in the surrounding fields. Alfred sauntered away from the house, eating a fig. Nathalie and her fiance were chatting under the oak. The pages in my pocket rustled as *i* leaned forward to a line of ants crawling along the window sill. She asked what father and *i* had discussed. *i* broke the ant's line with a flick of my finger. He was making things very difficult for everyone, she said, buttoning one of my shirt-collars. It was all the priest's fault, *i* replied.

- Look at me, Evariste.

Walking past her reflection in the oval mirror on the dressing-table, *i* went to the overcoat hanging sadly on the door. The priest wasn't to blame for father's state of mind, she insisted. Was she supporting him against father? She took a few steps toward me, embracing one of my starched shirts. Father had turned from God, she said, with an intent look. Her jawline was sharply set and the blue vein in her neck became prominent. Paris - the new Babylon - it was to blame for everything. It was the haunt of the Evil One. The source of atheism! The Apocalypse was at hand - the signs were there: crime, debauchery, chaos! She pleaded with me not to return, to stay and help her and father. His struggle was my struggle, *i* said, snatching the shirt from her. *i* would help him, but not with her Bible. *i* took out the sheets and rustled them in her face. A wink of lightning sent boulders rolling over the house. The lamp's glass beads tingled.

- Mathematics, mother! The new Testament!

She twisted the brooch holding the collar around her sinewy neck. *i* felt a jab of compunction, but *i* warned myself against succumbing to her eyes brimming with tears. She had taught me the Gospels well. Was *i* treating her harshly? Was *i* being cruel? But the spirit

of mathematics demanded aloofness, as did the spirit of Christianity. When Christ had become aware of his higher mission, he spurned his mother at Cana. What were the words he had used? 'Woman, what have you got to do with me.' *i* had my mission in life too, and the spirit of mathematics said, 'If you would follow me, deny maternal sentiment.' If many were called and few chosen for heaven, few were called and only a fraction were chosen to serve the spirit of mathematics.

- Paris! It's corrupted you! Polluted your mind!

- My salvation lies in mathematics.

- Don't say such things!

- It will give me eternal life.

Father's overcoat fell as she closed the door behind her. *i* picked it up, considered it for a while, then put it on and stood before the mirror. The padded shoulders were too wide, the body too loose and long. In the right pocket *i* felt a piece of paper: it was folded carefully in thirds, and then in half. My initial curiosity checked by a sense of propriety, *i* placed it on the table and deliberated whether to read it. A squall swept aside the curtains and blew the note to my feet. *i* closed the window. Lightning flashed, like a vein in a straining neck. A massive boulder cracked, crumbled to heavy drops. Sitting at the table, *i* recognised father's handwriting. It was addressed to mother. Two short lines said that he must leave at once for Paris on urgent business. Nothing more. What did it mean? And why the diagonal cross through the message? Maybe something had come up that prevented him going, and he had casually dropped the note in his pocket instead of the fireplace.

Little was said at supper and *i* was glad to return to my room. Lightning scourged the church steeple, thunder shook the house to its very foundations, rain pelted the roof. *i* lay on the bed and felt the pages in my breast pocket, as though reassuring myself of my significance in the midst of such a storm. Suddenly my heart bolted, and *i* felt helpless before the fury outside. By reflex, the way someone might reach for a cross in a moment of crisis, *i* pulled out the solution and sprang to the table. *i* hadn't looked at it since that afternoon, and now, reading the first page intently, *i* was surprised at the depth of my insight. This was proof of my significance: the storm might destroy the town, but not the solution. By the second page *i* read calmly, at times barely able to make out my own writing, so swift had been my thoughts on that wonderful afternoon. But *i* stumbled - a step didn't look right! It seemed flawed! *i* read it a few times, got to the thought behind the symbols, the assumption behind the thought. A mistake! It struck me like a bolt between the eyes. The solution to the quintic was no solution at all. Stunned, *i* dipped the quill and drew a thick line through the mistake. *i* wanted to be lashed by lightning, crushed by thunder.

{Therefore if M is the letter conjoint to 1, the letter conjoint to m^2 will be $m^2 M$.}

There wasn't much oil in the lamp. *i* kept the flame low - it would have to see me through the night. Closing the shutters, *i* saw them going out, walking arm in arm across the courtyard, probably off to the theatre. d'Herbinville glanced up at my window. She looked the other way. Where was my anger? *i* sat at the table and mused over my memoirs. A small spider was wriggling on a thread hanging from the lamp. Spinning frantically, it descended onto the page and remained motionless above the pronominal x , as though intrigued by its mystery. Twitching to life, it crawled down the page and stopped again, this time on an equality sign, where it shuddered, as though not knowing whether to move right, toward the waiting mouth of zero, or left, into the maze of an n th degree polynomial equation. It crawled

right, reached a blank space, contracted its legs as though pulled from within, and died as a spot no bigger than a full-stop.

{When M is a square, we shall have $M^2 = 1$.}

Nothing eventuated from the first lecture, but the response heartened me, and *i* was still optimistic that someone with influence might attend subsequent lectures. After a night of hopeful plans interrupted by fitful dreams, *i* woke the following morning still feeling excited, eager to rework my theory on the solution of equations. Ten days earlier *i* had been summoned to appear before members of the Royal Council for Teaching, who were to ratify my expulsion from the Preparatory school. One of the members was Poisson, the mathematical physicist. After the proceedings, he spoke to me in the corridor and encouraged me to pursue my work, of which he had heard good things, and suggested *i* submit a memoir to the Academy. When *i* related how the Academy, through Cauchy and Fourier, had already lost two of my memoirs, he promised to take special interest in the paper and present it to the Academy personally. At the time *i* dismissed the offer as nothing more than kind but empty words, intended to ease a young man's anger and an older man's conscience. But *i* felt differently the morning after the lecture. Working with some of my former intensity, *i* finished the memoir in the afternoon and hurried off to test Poisson's sincerity. His study was littered with papers, pamphlets, books. He invited me to sit down, but he seemed preoccupied, as though his mind were teeming with problems and projects. *i* felt uncomfortable during the short visit: he hardly looked up from the pages on his desk, and the conversation gaped with long pauses. In the end he accepted my memoir and said he would submit it to the Academy at its sitting in mid-January.

The next four lectures weren't successful, attendances fell away, and we had to cancel the fifth. *i* wasn't too disappointed though: my hopes were buoyed by Poisson's promise. But a month after the memoir's submission, there was still nothing from the Academy, despite the fact that it had met on two occasions. Poisson had also been silent, even though he and Lacroix had been appointed by the Academy as referees of my work. Doubt gnawed at me again. Thoughts of Abel's fate at the hands of the Academy began to darken my hopes.

Bitter and angry, *i* set out one morning with a group of young Republicans to the church of Saint-Germain-l'Auxerrois, to protest at a mass attended by Legitimists. The mass was ostensibly to be a memorial to the Duc de Beri, Charles' younger brother, who had been assassinated eleven years earlier, but we knew it was nothing more than a declaration of support for the Church and the deposed King Charles who was in exile in Italy. It was bitterly cold. Each brisk stride, each burst of vapour, stoked my hatred and anger. Thoughts of mathematics melted like snowflakes. This was an opportunity to strike back at my enemies. As we marched over a bridge, a few of the others exchanged crude jokes and boasted about women. My anger flared. They should save their breath to incite the crowd, *i* shouted, as though thinking aloud. *i* was too intense, one of them laughed, tapping me on the shoulder. *i* ought to join them one evening. Good wine, bad women - life would never be the same. The others chuckled. *i* ran ahead, eyes watering, ears stinging. A boisterous crowd in front of the church abused and intimidated those entering. People were shouting that the mass was disrespectful to the memory of the patriots who died last July. *i* pushed through to a speaker: a young man in a black overcoat and yellow gloves, who urged the crowd to stop the Jesuits before they made a puppet of King Louis-Philippe, just as they had done with Charles. We shouldn't be deceived, he declared, raising a fist. The Church served and protected the interests of the rich. We should destroy all churches and use the stone to build hospitals,

schools, orphanages for the children of the dead.

The crowd rushed toward the entrance of the church. *i* plunged into the torrent. One with the swell bursting through the gates, *i* was no longer a mathematician, no longer even a Republican: more than the sum of individuals, the crowd imparted its momentum to each member, overwhelming the personal. There was liberation in chaos, in the dissolution of myself, in being swept forward by the driving force of the common will. Shouting 'Down with the Church', my voice was a river thundering toward a waterfall. Pushing forward, my body was a powerful instrument of history.

The coachmen in the courtyard were startled: before they could save their vehicles from the rush, horses were screaming, rearing, breaking away. Panic swept through the congregation as it struggled against the tide surging into the church. On the pulpit the elderly priest raised his hands, as though his pink palms would serve as a bulwark. The wave crashed against the altar, and the priest leapt away and ran off with a spritely step, lifting his cassock above his kness. Men with axes, picks, sledgehammers smashed balustrades, statues, confessionals, pews, the pulpit, and then turned their fury on the marble altar. *i* ripped hymn books, tore down paintings and tapestries. Wine spilled onto my chest as *i* snatched a chalice and threw it at a slender stained-glass window, shattering a pale angel. In an instant all the windows spilled to the ground. Rioters broke into the back rooms and emerged with flagons of wine, vestments, staffs, croziers. They put on hats, cassocks, surplices, chasabules, and challenged each other to greater acts of desecration. Raising a marble cross with a silver Christ, *i* looked around for something on which to shatter it. Mother appeared: she held me with an imploring look, then read from Revelations in a soft voice. Father took her place: he unbuttoned his collar and pointed to a blue circle around his neck. *i* smashed the cross against the wall, and the silver statue snapped at the waist. The interior was soon reduced to rubble, and the cry 'Demolish the church' became a wild chorus. We scrambled outside. Encouraged by a roar of approval, those with tools attacked the columns and walls, until the roofbeams cracked and the roof collapsed in a cloud of dust.

- To the Archbishop's palace! a voice screamed.

We surged to the vicinity of Notre-Dame where, in the absence of opposition, we spent the afternoon ransacking the Archbishop's residence, which had already been damaged in the July Revolution. Enormous fires stoked with furniture, religious ornaments, clothes, curtains blazed against the night. Flames danced on the dark Seine. People gathered in rings around the fires, singing the Marseillaise, vowing to complete the demolition of the palace in the morning. By midnight most of the crowd had dispersed. *i* remained with a group around a fire still burning vigorously, determined to watch until the symbols of father's murderers turned to ash. Flames crimsoned the faces and palms of those sitting on scraps of furniture, huddled against the piercing chill. A toothless old man encouraged us in our vigil, saying this cold was nothing compared to the Russian winter, and he recounted stories of Napoleon's invasion. Reclining on a broken divan, *i* looked up from the twisting flames: through a maple's stark branches the stars were like the tips of icicles. A young man wrapped in an ecclesiastical robe raised a large portrait above the fire: a bishop in scarlet, with black circular spectacles, clutching a book with his right hand.

- Inquisitor! exclaimed the young man, his robe glittering in the restless light.

And he threw the painting onto the burning pile. The canvas curled at once, the paint sizzled and smelled, the bishop went up in a tongue of flame. The rectangular frame blistered, blackened. *i* saw the frame as a golden section: a rectangle whose ratio of length to width was equal to the limiting ratio of consecutive terms of the Fibonacci sequence. And what if all rectangles were destroyed by fire? Would the golden section still exist? Perhaps it would be

restored to its ideal state. If there was a God, he wasn't in those objects crackling in the fire. A process, God was restricted and diminished by objects. Like x , fire was also a liberator, restoring God to His rightful place. My head fell to the smell of wine on my chest, and *i* hovered in a state between waking and dream, in which *i* witnessed a great purging conflagration.

- The fire of the Apocalypse, announced mother's voice.
- The fire of freedom, countered father's.

This was the fire that would purge the accretions of matter clinging to the mind, and join mind and mathematics in a holy union. And my flesh melted in the conflagration, and *i* became expansive, disembodied thought, zero and one, π and x , an equation with infinitely many solutions, both real and imaginary...

i woke with a start: someone had thrown a cassock over me as *i* slept. Sweeping it aside, *i* threw it on a pile of charred beams and smouldering rubble. It was dawn. The crowd was gathering again to complete what the night had interrupted.

- To the palace! shouted a fellow wrapped in a velvet drape.

Yawning, shivering, we shouted, sang, swore, and gradually worked ourselves into a rage. We stormed the building, smashing and tearing as we went from room to room, from floor to floor. In one of the dining rooms, *i* was stopped by my reflection in an oval mirror hanging on the wall. *i* picked up a black marble sphere which had ornamented a clock shattered in the fireplace, and shouted to a few men to get out of the way. A clearing opened between me and the mirror. *i* aimed. $4/3\pi r^3$. But there was now nothing transcendental about π at that moment. The sphere was hard and dense, its gravity attracted an infinite number of decimals, concentrated them, reduced them to the blackness before the first number, the great zero, of which the sphere was a physical representation. *i* threw it, shattering myself and the room into countless jagged fragments. The crowd cheered wildly. A young man leapt onto the mantelpiece, pulled the mirror-frame off the wall and held it up before an old man.

- A magic mirror! he laughed. It ages people in an instant!
- And restores youth to others, grinned the old man.

As rooms left and right were being pillaged and objects thrown from the windows into the garden below, *i* followed a group to the double doors at the far end of the corridor.

- Stand aside!

A passage was made for three men running with a large wooden cross ripped out of the refectory. A man at each arm and one at the foot, they rammed the head against the lock. The doors flew apart. Pressed in after the cross-bearers, we stopped dead still. Everyone appeared overwhelmed by the impressive tomes arranged in glass shelves, by colourful manuscripts in showcases, by rare Bibles. Most of the rioters were from working classes, probably illiterate. Was their reaction a kind of awe before the library's solemnity? The men now held the cross upright, all three supporting the vertical beam. Suddenly, one of the young men in black overcoat and yellow gloves, climbed onto a writing desk and snatched an inkpot.

- Down with the Jesuits! he shouted.

He threw the pot at a glass shelf, staining his gloves with green ink. A whirlwind shattered cases, toppled shelves, upturned desks and tables, ripped paintings and parchment scrolls. Books had their spines broken, covers torn off, pages scattered in the air. Books in French, Latin, Greek, Hebrew were thrown from the windows. A corner cabinet was smashed open and ancient Bibles thundered onto the floor. *i* picked up one in a silver jacket, inlaid with stones, fastened with a clasp - it was in Greek, with coloured letters and drawings from the careful hand of a monastic calligrapher. A large letter X checked me from ripping out the

parchment pages. It was coloured in purple, with vines coiling around it, surrounded by pastoral scenes, with the sun above it. No! It wasn't the letter of life! Not the symbol of liberation! Fear, enslavement, death - that was its secret meaning. It was meant for those who feared death, who needed a sacrificial saviour because they lacked courage to sacrifice themselves for their beliefs. This was the letter which killed father because he dared to oppose it, which beguiled mother with false promises. It had no place in the Republic. The symbol of the future was the x of pure mathematics. Through it men would perform miracles, solve the great mysteries of the universe, overcome death. *i* tore out the page, shredded the letter, pulled the book from its jacket and threw it from the window.

Having devastated the Archbishop's residence, we spilled into the courtyard garden littered with furniture, books, vestments, sacred objects. Adding the final touch to our rampage, we cleared the courtyard by throwing everything over a parapet, into the Seine.

- Stop! For God's sake! Not in the river!

A tall, gaunt man was rushing about, trying desperately to prevent those with books from throwing them in the river. It was Caillot. The crowd dismissed him with a laugh or a rough shove. He picked up a few books, but they were knocked from him. He embraced a few others, they were torn from him, like children from his arms. Shrieking, he pushed through the taunting, jeering crowd and ran down the steps to the river bank, where he knelt and reached out for books floating near the edge. His fingertips were on a large open volume, when a fellow with a red cap pushed him into the river. Uproarious laughter resounded from the parapet, where people had climbed to watch the scene. He thrashed about, up to his neck in books, and would have drowned, but for a passing fisherman who hauled him into a skiff and rowed away from the commotion.

From there we turned to Notre Dame, but our fury was blocked by a strong presence of the National Guard. Frustrated, though still excited by the pillaging and the wine from the Archbishop's cellar, a large section of the crowd turned from riot to revel. It was the middle of carnival season: people in costumes and masks were dancing and parading throughout the city. Making the most of the opportunity, the rioters dressed in ecclesiastical garments joined the revellers, praying and chanting as they went. Disappointed at the turn of events, *i* remained behind, alone in the cathedral's cold shadow.

{But this simplification can be effected only for $p = 5$.}

i was scribbling again, this time on the back of a manuscript - but not mathematics. Strange, the things the mind was capable of in moments of distraction. *i* had destroyed her letters two weeks ago, and now, to my amazement, *i* had written them out, almost word for word, down to her name and date. But the transcriptions were obscure, perhaps deliberately so: here and there, *i* had left gaps and omitted words. Why? And if the papers should eventually find their way to Chevalier, what would he make of these cryptic messages? Let's end this affair...Don't think about what didn't exist and what never could have existed...There never would have been more...Your assumptions are wrong and your regrets have no foundations...And if they fell into the hands of a biographer? Would he attempt to reconstruct the last days of my life from scraps like this? Unknown even to myself had *i* perhaps left gaps in the transcriptions in order to intrigue biographers? With two black lines *i* obliterated her name. Would some future researcher uncover what lay under those black lines? Discover the name of the woman responsible for my death?

{For $p = 7$ we find a group of $\frac{(p+1)(p-1)}{2}$ permutations,
where $\infty, 1, 2, 4$ have respectively the conjoints $0, 3, 6, 5$.}

Monsieur Richard invited me to sit and asked if *i* would like a cup of rosehip tea, adding that it was good for the digestive system. Not waiting for a reply he shuffled off in a pair of Persian slippers. His apartment in a wing of Louis-le-Grand was full of books, journals, manuscripts, busts, lithographs, artefacts, astronomical instruments. He returned and extended a jittery cup.

- Your attempt at the quintic was good, he said.

- And my mistake?

He was forever receiving letters from people claiming they had proved Fermat's Last Theorem. Most of it was sheer nonsense, and the authors were so ignorant of mathematics they failed to see blatant flaws in their reasoning. In my case, he had been impressed not only by the nature of my attack on the problem, but by the fact that *i* had discovered my mistake. *i* was encouraged by his friendly tone. He picked up an abacus with Chinese characters and flicked the crimson counters. Had *i* heard of Niels Henrik Abel? No? He was a Norwegian mathematician, not much older than me, probably twenty five or six. Richard had met him when Abel visited Paris two years ago. He was a shy, modest fellow, extremely frail, with a terrible cough. At sixteen he discovered his aptitude for mathematics. His talent was recognised by his teacher, Holmboe, who suggested he read, among other things, Lagrange's work on equations and Gauss's *Disquisitiones Arithmeticae*. His father died when Abel was eighteen, and the burden of providing for a large family fell on the young man's shoulders. To his credit, he took on the responsibility without complaint, offered tuition to private students, and pursued his own researches at every opportunity. During these difficult years he was sustained by the hope that his talent would be recognised, and that he would be offered a teaching position at a university. But things became more desperate. Holmboe arranged subsidies for him, and, when they were no longer available, provided financial support from his own pocket. Abel had been my age when he tackled the quintic. Like me he thought he had found the solution, only to discover a few days later that he was mistaken. He had probably been just as devastated by his discovery as *i* had been with mine, but only temporarily, for he quickly resumed his work, intensifying his attack. But this time, instead of a solution, his efforts led to a brick wall. Was the wall something of his own making? Did it arise from faulty reasoning? Did the solution lie on the other side? And then, in what must have been a flash of inspiration, he accepted the reality of the wall, accepted there was no solution on the other side, and, doing an about face, set out to prove that the quintic couldn't be solved by radicals. In a burst of brilliance, he verified his conjecture using the method of proof by contradiction. *i* couldn't keep my cup and saucer from chattering.

- The proof's an absolute gem, Richard smiled.

No solution! *i* had spent the last six months looking for one, invested my hopes on it, based the meaning of my life on its existence, and now Richard was sitting back in a faded armchair, clicking counters, telling me that my efforts were doomed from the very start.. *i* had to see the proof. Where could *i* find it? Was it in the school library? He had been so impressed by the clarity and concision of the paper that he had made his own translation.

- It's lost nothing in translation, he said, handing me several sheets. And that's not to praise myself as a translator, but to point out the universal nature of mathematics.

i was too excited to concentrate on what he was saying, though it was something to do with languages being a curse on mankind, a punishment for aspiring to heaven on the Tower

of Babel. But a new Tower would be built, taller and stronger than the first, and mankind would be gathered together, united, made one again by the language of mathematics.

Through the courtyard filled with sooty night, *i* scraped over the shadows of the dormitory's window-grills, and stopped on the steps. Silence was required for a thorough study of the proof. But where could *i* find it in this place, at this time? Another hour and the lights would be out. *i* couldn't wait for morning. *i* needed a quiet corner tonight. A room set aside for private study! As *i* raced up the stairs, two prefects swoop on me from above, blocking the light from the open door.

- Where have you been?
- What are you Republicans planning?
- Is that your manifesto?
- Let's see the subversive material.

One of them attempted to snatch the rolled sheets, but *i* stepped back and pointed out that the material belonged to monsieur Richard. They retreated, whispered, then approached me again. *i* had better show them, they warned, or they would report me. In the doorway *i* unrolled the pages under a hissing lamp. Heads almost touching, they bowed to the text. What was all this? Either my salvation or my damnation, *i* replied, excited by what was on the first page. Was it a manifesto written in code? Exactly. Shoulders touching, alarmed, they bowed closer to the text.

- See this line, *i* said, pointing.

They followed my finger across the page.

- It says: 'Down with the king'. And this one: 'Away with the church'. And this: 'Long live the new order'.

- They're subversive words, Galois.

- Only to those ignorant of mathematics.

i slipped from their midst, ran upstairs, and tried a few study rooms before finding an empty one. *i* sat and placed the proof face down on the table. Restraining my curiosity, *i* closed my eyes and crossed my fingers on the sheets, as though my fate were contained in what *i* was about to read. Was it just coincidence that both Abel and *i* had been drawn to the quintic? Or had quintic chosen us for its fulfilment? Hadn't that been the case with calculus? When the time was right Newton and Leibniz were summoned, quite independently, to bring the new theory into the public domain? *i* began reading. Slipping into my element, *i* was no longer burdened by flesh - mind and will moved as one. The proof developed gracefully, its exposition was clear, its conclusion irrefutable. Not only admiration, the proof stirred my envy. How could *i* go beyond Abel's findings. He proved the general equation of degree five and higher couldn't be solved by radicals, but what about particular quintics? His proof said nothing about them. My approach to the problem differed from his: *i* used far less algebra and more of the theory of groups, which *i* had derived from Lagrange, who hadn't fully appreciated the significance of his findings. My method would go beyond Abel. Once *i* had grasped the subtle relationship between groups and equations, *i* would be able to determine the solvability of any equation. My theory would in fact subsume Abel's work, prove his result more succinctly, with algebra taken to new heights of abstraction.

{The substitutions of this group are of the form $x_k, x_{a \frac{(k-b)}{k-c}}, b$

being the letter conjoint to c , and a a letter which is a residue or a non-residue simultaneously with c .}

i reached for the slim journal in Richard's hand. It contained my first publication - he had suggested months earlier that *i* send the paper to Gergonne, whose editors he knew. The sun beamed through the fine curtains, highlighting books, objects, details *i* hadn't noticed on my previous visits at night. We sat at a round table in front of the window overlooking the school courtyard. Swallows darted across the clear sky.

- Page 294, he said, sharing my excitement.

Sunlight slanted onto the title page, bringing out the texture, the ink, the indentations of the letters.

A Proof of a Theorem on Periodic Continued Fractions.

BY M. EVARISTE GALOIS, STUDENT AT LOUIS-LE-GRAND COLLEGE.

There was proof of my talent, he said. He advised me to work hard, systematically, and, above all, to be patient. He went to make tea and *i* basked in his praise. *i* had wanted to tell him that this paper was a trivial aside compared to my researches during the past few months. If this proved *i* had talent, the memoir *i* was working on would be deemed the product of a real mathematician, perhaps of ...

In an engraving between bookcases the name of the shadowy figure was now visible - Mersenne. Everything fell into place at once: the pointed cowl on his back, the emaciated face, the beard and close-cropped hair. A large book under his left arm, Brother Mersenne was looking sideways with a mild expression. *i* imagined the Franciscan monk walking thoughtfully along a cold cloister. At a time when the Inquisition was defending the faith with fire, Brother Marin Mersenne had managed to reconcile number theory and religion. He spent many years investigating prime numbers. Did he believe they possessed a spiritual essence? Were they the purest expressions of the mind of God? (*i* had also been studying primes, in relation to equations whose highest power was a prime number.) As the most essential of numbers, did primes permit a glimpse into the mind of God? Not the chaotic, irascible God of Moses, but the Creator of cosmic order. How had he managed to marry his vigorous intellect with vows of poverty, chastity, humility? Weren't Christianity and mathematics mutually exclusive, as Pascal had said? Or had Mersenne lived his monastic vows through mathematics? Had he made chastity possible through the love of pure number? Had he accepted poverty as the natural condition of a life dedicated to the unprofitable pursuit of primes? Had humility been evoked by the constant reminder that numbers were infinite. Yes, Brother Mersenne had glimpsed the awesome splendour of number, and this had been responsible for his pious wonder. He stated that 2 raised to the power of 257, minus one, was a prime. Such a number was impossible to write: it would exhaust not only all the ink and paper in the world, but countless lives. And yet that number existed as an entity, perhaps in a state beyond time and space. What had prompted him to declare it a prime? A guess? Intuition? Perhaps a kind of revelation. Religious prophets were always looking into the future, why not a prophet of mathematics? Was that number a prime? Nobody had been able to say. Maybe in two hundred years Pascal's calculating machine might evolve to a stage where it could determine the nature of any number. And if it verified Mersenne's statement, the power of insight and intuition would be vindicated.

The bold letters in my name glistened. *i* had written it countless times, in black, blue, brown, in cursive and in block, on paper and parchment, but it had never impressed me like this. The EVARISTE GALOIS of the printing press was now a public figure: the press had imposed an identity on me, one that would eventually subsume the name *i* had learnt to write under mother's guidance. *i* was no longer a youth: the press had made a man of me, placed me

among the ranks of mathematicians. Not only this, the press banished personality from the text, invested it with a kind of mathematical precision, stamped it with the authority of an absolute truth, gave it a quality that seemed to transcend time. Seeing my printed name, *i* felt as though my former self had been crushed by the press, and that a new, immortal self had arisen through the regenerative power of printer's ink.

- May there be many more, said Richard, returning with the tea. If it were up to me I'd admit you to the Polytechnic on the basis of this alone. You have the ability to be another Abel, though I sincerely hope your work fares better than his with our Academy of Sciences.

- What happened to his?

When Abel had come to Paris he entrusted Cauchy with a memoir on Transcendental Functions. Busy with his own work, Cauchy passed it on to Hachette, who in turn presented it to the Academy. Two years later, the memoir hadn't been judged - in fact, there was absolutely no trace of it. Poor Abel! It was said he was living in abject poverty, and that his health was deteriorating rapidly. He had been treated for consumption during his visit to Paris. Richard feared his days were numbered. Living in poverty? With his genius? Genius didn't always provide food on the table. Couldn't a position be found for him? Richard shrugged his shoulders. Not even for his work on the quintic? His emphatic no stunned me. Abel must have had the same dreams as *i* at sixteen, yet, despite his genius, those dreams had turned to ash and he was now facing the prospect of dying in his youth. Could the same fate befall me? A shiver went through my body.

- My interest in you isn't all altruistic, Richard said, blowing into his cup. When you become famous, and biographers record your life and work, I'd like posterity to think well of me, to say: he wasn't gifted, but he loved mathematics, and he nurtured Galois' genius.

Was this his sense of humour? Or did he mean it? Mathematics, he continued, gazing out of the window. The great virgin Queen of Science. We had to serve her as best we could. Some by running around in her courtyard, others by waiting in her ante-chamber, and the chosen few, those with genius, by taking their orders directly from her. The Queen of Science, he sighed. What would those Republicans make of that metaphor? Those anarchists would do away with all references to royalty. They would change the game of chess, reduce all the pieces to the status of pawns. Their ideas were infiltrating the school. He warned me to stay away from them, to concentrate on my work. *i* was destined for higher things. *i* skimmed over my publication as he spoke and stopped on a line on page 300 - stunned.

- They've made a mistake, *i* said.

He got up and looked over my shoulder. An equation should have been $x = 3 + 1/y$, but it had been printed as $x = 3x + 1/y$.

- Typesetters! he exclaimed.

It was a blot on my work, even though it would be obvious to anyone with a basic knowledge of algebra that the error wasn't mine. It could have been worse, he commented, sunlight penetrating his thinning hair as he bowed over the journal. They might have misspelt my name, or, worse still, mislaid my manuscript.

Another engraving was reflected in the circular mirror above the fireplace. Reading backwards, *i* managed to make out the title in the top corner: MELENCOLIA. Was it an angel or a muse? Compass in hand, the figure sat with head propped on an arm, surrounded by instruments for measuring matter, space and time. The artist had kept to tradition: the figure had female features, just like the ancient muses. But if this were the muse of mathematics, why a woman? What did women have to do with the spirit of mathematics? And why was the figure so morose? Had she glimpsed the vastness of knowledge? Was she trying to come to terms with π ? Or was she pondering the possibilities of the sixteen-celled

magic square above her head. The artist was no mathematician, or he would have known that the muse of mathematics was never subject to melancholy.

Gliding my fingers over my name, feeling the letters' crisp indentations, *i* asked whether *i* might keep the journal. He said he would obtain another, and then advised me to prepare for the Polytechnic. Entrance wasn't determined on the basis of talent alone. *i* should put aside my researches for the next two months. He would help me: he knew the type of questions the examiners put to candidates. *i* should remember that sometimes we needed to take a few steps back in order to leap into the future. Nodding, *i* stood and glanced at a small etching of Euler on the mantelpiece. An old man, blinded by cataracts, he squinted at posterity. He wasn't resigned to darkness and death: his active mind didn't need the sun in order to see the absolute truth. Perhaps the sun was the greatest obstacle to mathematics, in that it imposed the physical world upon the senses, making abstract thought that much more difficult. Euler had been more prolific than ever at the end of his life, dictating his ideas to family members, who could barely keep up with his swift mind. His impairment may have contributed to his massive output: blind, he dwelt in a state of pure mathematics.

Put aside my research? Never! The article had stoked my enthusiasm. *i* would work even more single-mindedly on the conditions for the solubility of equations of prime degree. Nothing would hold me back, not even Richard's advice. Let the others, the mediocre, make special preparations, *i* had more important things on my mind.

{For $p = 11$, the same substitutions will occur with the same notations, $\infty, 1, 3, 5, 9$, having respectively for conjoints $0, 2, 6, 8, 7$.}

The inkpot was empty. *i* had used up the ink in scribbling over my manuscripts. So much for the letter *i* had half thought of writing to Chevalier! But it was better this way. No more hope, no more delusions. *i* went to the window. Between two chimneys across the street the evening star quivered, like a sharp note struck by a tuning fork. The smell of lamb stew and the sound of cutlery rose from the open windows of the sanatorium's dining room. Perhaps *i* should be down there, having my last supper. *i* walked around the room and thought about burning my manuscripts. But *i* couldn't bring myself to do it. Why? The flame was there, on the table - a slender tongue yearning for the crisp pages. Was *i* superstitious after all? Like certain people who gathered their hair after each cut because they saw themselves in it, and then used it to stuff their pillows. Maybe *i* still saw my soul as being somewhere among those symbols, theorems, propositions. My soul? No, not in a Christian sense. Nothing to do with mother's heaven and hell. A soul beyond good and evil - an entity glimpsed through intuition, like Mersenne's prime number. My puny body - *i* didn't care if it turned to ash. But my soul? The thought of it going up in smoke made me uneasy. *i* arranged the papers in chronological order. What next? Something was beginning to stir within me. No, there would be no more scribbling, unless of course *i* used my own blood.

{Thus for the cases $p = 5, 7, 11$, the modular equation can be reduced to degree p .}

We sat opposite each other in the carriage, knees touching at each jolt, his cologne mingling with the smell of boot polish. The sanatorium Faultrier was clean and quiet, he said. *i* would have my own room, nourishing food and the services of his good friend Dr. Dumotel, the resident physician. But why had d'Herbinville gone to so much trouble and expense?

Paying from his own pocket for what would be a two month stay at the sanatorium? *i* was too weak and tired to pursue the question. The city had cast off its grey overcoat. After eight months of grim, morose faces, the people on the streets seemed cheerful, their movements lively. *i* should have been happy leaving Sainte-Pelagie, my parole would be almost like freedom, and yet *i* couldn't overcome a feeling of numbness. Had prison crushed my spirit to such an extent that even freedom was a matter of indifference? A shopfront sign alarmed me: *i* could barely read the proprietor's name, even though it was in large red letters. *i* looked at more distant signs: they were all blurred. Was it due to my general weakness? The hacking cough? Would my sight improve with an improvement in my health? What if *i* went blind? Well, *i* could then concentrate exclusively on mathematics, just as Euler had done.

- The fourth new fountain I've seen today, he said, pointing to a few stonemasons working in a corner of a square. Fresh water's vital in preventing cholera.

i recalled Ogin's description of a cholera victim's eyes.

- Is it true there's no cure?

Opinions differed, he said. The authorities had issued a document on how to avoid the disease. They suggested people remain composed, avoid over-exertion and emotional upheavals, abstain from all forms of excess, introduce sunlight into their homes, take tepid baths, eat food that was easily digestible, safeguard against chills, and avoid sleeping too many in a room. Splendid measures for those who could afford them, but about the poor?

The carriage stopped in front of a three-storey building behind an imposing wall. The numbers 84-86 were flaking in the marble plaque above the entrance. As we crossed the front courtyard, d'Herbinville nodded - a young woman waved from the first floor window in a wing to the left of the main building. After introducing me to Dr. Dumotel, he helped me to my room, embraced me with affection and promised to visit regularly. *i* opened the shutters and the room filled with morning light. Swallows flitted above the courtyard with bits and pieces in their beaks. The young woman was on the front steps. bright in the sunlight. *i* had seen her before, but where? Or was my blurred vision playing tricks? A black cat arched its back and rubbed against her ankles. She didn't mind the cat, until d'Herbinville stepped into the courtyard, and then she pushed it aside with her foot. Beaming a smile, he strode across the yard and kissed her hand. On the balcony during his trial! And later in the carriage! That was where *i* had seen here! They walked arm in arm toward the gate. The spring sun warmed my face and hands, blossom scented the air. For the first time in months something like hope stirred faintly within me, as though my heart were thawing.

{In all rigor, this equation is not possible in the higher cases.}

A week later *i* felt strong enough to leave the sanatorium and go for a walk through the city. Though the shadows that had haunted my eyes had all but disappeared, leaving a faint blue tinge, *i* was still troubled by Ogin's words, still waking in the middle of the night, drenched in sweat. The last vestiges of fever and fatigue, the doctor had reassured me. But even that couldn't fully dispel my fear of cholera as *i* left the courtyard. We almost collided at the gate. Her cylindrical cardboard box fell and rolled to my feet. It was my fault: preoccupied, *i* wasn't looking where *i* was going. Before *i* could overcome my confusion, she picked up the box and brushed the crimson bow on the lid, apologising that she hadn't seen me coming. The sweetness of her apology flustered me. The tips of her pointed shoes peeped from the hem of her dress.

- Aren't you monsieur Galois?

My name had never been said so sweetly. *i* glanced up, nodded. She was about

eighteen or nineteen. As she told me her name, a crow called raucously from a sooty chimney. Monsieur d'Herbinville had told her about me, she added. Was it true *i* had sacrificed a promising mathematical career for the Republic. Ogin's shaggy features appeared in a patch where a chunk of render had fallen from the wall.

- You must visit us with Pecheux, she said, picking at a button between her breasts.

i nodded and left abruptly, pulse pounding in my ears, steps light, unsteady. *i* tried to compose myself by breathing deeply the mild breeze scented with blossom. The day was more like late April than late March. Dark, damp, the last two months in prison had frozen my emotions: *i* hoped for nothing, looked forward to nothing. Mathematics and the Republic became chilly mists. Now, strolling under this avenue of budding elms, my emotions were beginning to thaw. The sun's touch was friendlier than ever. And all the time *i* couldn't get her features out of my mind. Her smile as she said my name dispelled the brooding Ogin. *i* had never felt like this. Obsessed by mathematics and politics, *i* never had time for such emotions. Now, in my present loneliness, in my uncertainty and anxiety about the future, she appeared, bright and warm as the spring sun.

i entered the Place de Greve: the square from which *i* had set out eight months earlier to plant trees of Liberty. Cobbles had been dislodged and the tall saplings were decorated with red, white, blue ribbons. The square bustled with activity: grinning faces, grotesque masks, vendors hawking their wares, musicians playing against each other, entertainers in costumes. A juggler walked a tightrope stretched just above the ground: five knives flashed in describing precise parabolas and circles, each held for only a fraction of a second. *i* could once juggle mathematical concepts like that: arrange the coefficients of equations, create groups, distinguish between groups, determine the solvability of equations - all in my head. Would *i* ever regain that mental dexterity? People gaped at the juggler, whereas my talent had attracted no attention, my memoirs overlooked, lost.

- Cholera morbus! Cholera morbus!

A clown parted a section of the crowd.

- Cho-le-ra! Cho-le-ra!

Running and laughing, children picked up the cry and turned it into a sing-song chorus.

- Has it reached Paris? *i* asked the masked clown.

- Claimed its first victim, replied a woman's voice.

- Where?

- Rue Mazarine. Horrible.

i recalled Ogin's prophecy and mother's apocalyptic invectives against Paris. But the grim news didn't alarm me - her bright features were like a beacon of hope.

{The third memoir concerns integrals.}

Uncle met me in the town square. His clothes smelled of camphor as he wrapped his arms around me. The note at school that morning had instructed me to return home at once. Nothing more. Looking at uncle, *i* knew it was serious. We sat on a bench in the shade of a plane tree, beside a melon vendor. A few sharp wedges grinned deliciously. What had happened, *i* asked, bracing myself. He placed his arm over my shoulder. My stomach tightened to a knot.

- Your father's no longer with us.

i was in free fall, plunging through darkness, my thoughts in turmoil. Father, dead? Uncle tried to console me, but his words meaningless sounds. Two boys bought wedges from

the melon vendor and ate them greedily, juice trickling onto their shirts, flies buzzing around them. *i* was breaking apart, fragmenting, unable to stop it. If *i* could only cry, let out a howl, but nothing came, only a choking frustration. And then, out of the darkness and confusion, *i* heard my own voice, distant and faint: for an irreducible equation of prime degree to be solvable by radicals it is necessary and sufficient that all its roots be rational functions of any two of these roots. Like a prayer or chant, the words steadied me.

- How? *i* asked.

The boys laughed and spat black seeds at each other.

- He was a sensitive man, Evariste.

- How?

Again *i* wanted to cry out, scream that father couldn't have done such a thing, but all *i* could do was gaze at uncle's black boots. When? Where? Yesterday, in his Paris apartment. A stone's throw from school. So close together at that fateful moment! If only he had come to see me first, if only we had spoken together yesterday, if only...

As we walked home, *i* was numbed by the image of father hanging from a window latch. *i* felt betrayed. With each why, the pain and incomprehension fused to a seething anger. Where was the courage he had always advocated? Where was the will to fight against insurmountable odds? He had acted cowardly: abandoned his ideals, deserted his family, forgotten me. *i* had loved him more than anybody, and my love had been rejected. Love? Why did religions and poets extol its virtues? It had no virtues, or it would have kept father from that horrible act. Love? Never again! *i* would tear it out of my heart. Live without it for the rest of my life.

The house was dim, curtains were drawn against the sun. Mother rustled toward me in a mourning dress and embraced me tearfully. Nathalie and Alfred followed. Throughout the house friends and relatives stood stiffly, or sat bleary-eyed, or sighed to each other.

- The devil drove him to it, Evariste, she said in a broken voice.

i barely understood what was being said: anger still churned inside, made me insensible to everything but the fact that *i* had been betrayed, that father had left this world without so much as a note of explanation, or even a word of goodbye. The priest was the only devil, sobbed Alfred. He had driven father to his death. Mother fixed him with a reproving look. Tears bursting from his eyes, Alfred looked around self-consciously and ran from the room. *i* followed and caught up with him on the gravel path. We sat under the oak as a finch whistled from above. We had to fight father's enemies, he whimpered. It was our duty to avenge his death. We would, *i* said, trying to comfort him. Father hadn't been himself in the last month, he sniffed. The priest and his allies had been unrelenting in their attack against him. They had made him sick with suspicion, to the point where he thought everyone was plotting against him. He wouldn't eat or drink from fear of poison. He would lock himself in the study and peer from the closed shutters. Alfred broke down and cried uncontrollably for a few minutes. And mother made things worse, he went on. Always harping on the Bible, forever quoting Revelations, nagging him to moderate his views, to bow to the Church and make peace with the town priest. In the end he didn't want to see her, accused her of betraying him and colluding with the priest to bring about his downfall. And now she insisted we have a church funeral. And to add insult to injury, she wanted the priest responsible for father's death to conduct the requiem mass.

- We mustn't allow it, Evariste! We have to oppose her, in memory of father's Republican ideals. His death will be for nothing if she gets her own way.

- We'll oppose her, *i* said sharply.

- He spoke of you often, Evariste.

- What did he say?

He hadn't made too much sense in the last few weeks, but whenever he mentioned me his face would light up. His son, Evariste, would help him, he would say, as if addressing an enemy. His son would become a famous mathematician, he would bring glory to the Galois name and defend his father against the slander. The Polytechnic would fill him with knowledge and the spirit of the Republic. He would rise in his father's defence, the torch of mathematics in one hand, the tricolour in the other.

Alfred's words buzzed in my ears all afternoon. To escape the heat, the smell of vinegar permeating the house, the sweating mourners whose mouths were gaping holes that threatened to swallow me, *i* left quietly for the almond grove. The town square was now quieter. Vendors dozed in the shade. A dog struggled past me: paws scratching the hot cobbles, tongue flopping, almost licking its shadow. *i* was distorted in its sorrowful eye. At the fountain a woman was filling buckets containing marigolds, carnations, chrysanthemums. It was the gypsy. As she filled another bucket, her loose blouse opened at the top: her breasts glistened with perspiration. She flashed a smile. *i* turned away. On the steeple of the church across the square a crow had an apple core in its beak. *i* looked down at the symbols on the back of her wet hands: crosses, crescents, circles, an integral sign coupling with a vein.

- Marigolds for the mayor, she said in a sing-song voice, extending a bunch dripping on her bare feet.

A rooster shrieked. Her breasts trembled as she shook the flowers. *i* washed my face and hurried across the square. A few vendors were resting in the shadow of the church. The doors were open: a cool breath beckoned from the nave. *i* was about to enter, to sit for a few minutes and collect my thoughts, when the priest appeared, carrying a stack of hymn books under his chin. Turning abruptly, he lost his grip and the books scattered on the ground. He smiled at me. Alfred's words echoed in my head. Cicadas shrilled in the oaks along the side of the church.

- Would you give me a hand, he said, kneeling.

- You killed my father!

The cicadas drilled in my ears. He stood and brushed the dust from a book. My heart pounded, eyes brimmed with tears. *i* wanted to pour out my grief, condemn him for his part in father's death, but words and emotions clogged in my throat, and *i* ran off through the cicadas' rage.

The grove had been unattended since *i* was last there. A section of the surrounding wall had crumbled, nettles flourished, strangled the trunks. The scarecrow was nothing but a crooked cross. The cicadas were deafening. *i* sensed father's presence in the cottage. After Alfred's words and the encounter with the priest, *i* now felt a pang of remorse at my initial anger toward him. Why didn't you write to me, *i* asked, as though he were standing in the corner. You should have sent for me. *i* could have helped you. You wouldn't have been alone. The last few weeks wouldn't have been so terrible. You would have had someone to confide in, someone to support you. Father, father. Why? If we had been together, you wouldn't have...*i* know, *i* know. You didn't want to burden me with your problems, didn't want to interrupt my studies. My welfare - that's all you thought about, even on that terrible day. Have *i* ever considered your welfare? Yes, you tried to reach out to me, to tell me how much you were suffering at the hands of your enemies. Forgive me, father. *i* was self-centred, blind to everything except mathematics. *i* am also to blame. *i* was insensitive to your suffering. If *i* had only stopped to listen.

In front of the house people were milling around a gleaming hearse hitched to a pair of white horses. He had been a good mayor, said a man, tapping me on the back. They would

still be pushing wagons through mud if it weren't for him, added a second. His enemies wouldn't get away with it, shouted a third. Inside, people were rushing about from room to room, some carrying articles of father's clothing, others chairs and trestles. Uncle was counting money onto the extended palm of a man in a leather vest.

- It's a dusty drive back to Paris, the fellow grinned. Mind if I have a drink before I go?

Uncle pointed to the kitchen, and the fellow shambled off, the seat of his trousers shining. Uncle flicked open his watch - he would be back in a few hours. *i* didn't know what to do, where to go. Standing in a corner, arms crossed, *i* felt useless, out of place. *i* didn't respond to people who nodded or smiled. The air was oppressive, thick with the smell of candle wax, vinegar, perfume, perspiration. Mother came down the stairs with a pair of father's shoes. Seeing me, she slipped a black handkerchief from her sleeve.

- Paris, she sniffed. Satan's haunt.

Swallowing back a swell of emotion, *i* took the shoes from her. Father had worn them on civic occasions, and now he would wear them in the coffin as his murderer conducted a requiem mass over him. *i* scratched a spot of dried mud on the heel.

- Come with me, Evariste.

Sleeves rolled to the elbows, an elderly woman, a relative on mother's side, stopped her as we were about to enter the study. After exchanging a few whispers, the woman wiped the gleam from her brow with the edge of her apron and shuffled off.

Golden afternoon light filtered through the lace curtains and brought a richness to everything, including the soot in the fireplace. Her veil of grief lifted and she stepped toward me with a grim look: eyes glinting, lips sealed in a severe line, neck taut with sinews. Alfred was wrong, she said. Father's death had been caused by Republican freethinkers. He had been a moderate man when they married, but those atheists had corrupted him, turned him against the Church, and now they were planning to use the funeral for their political ends. As she spoke *i* glanced at father's possessions, and with each glance my affection for him grew, while my anger at her and the priest become sharper. She wanted me to leave my studies, return home, help her with the school. It could provide a good livelihood if it followed the teaching of the Church. This wasn't the time to be discussing such things, but she had to look to the future. Grief wouldn't meet the family's needs. Father had wanted me to become a mathematician, *i* said, feeling a nail inside the heel of the right shoe and wondering how father had put up with it. What about her wishes, she cried. Didn't she deserve a little consideration, if not sympathy? *i* idolised him at her expense. Why? What had she done not to deserve a little affection from me? He wasn't the hero that *i* had made him out to be, she said defiantly. If he were, he'd be with us today, standing in those shoes, seeing to the welfare of his family. *i* clapped the heels as though crushing an insect. That priest! He had been the cause of father's death and he was now gloating over it. No. The Church was forgiving - it was still prepared to accept him as a Christian and give him a proper burial. How considerate! It drove him to his death, and now it offered to bury him. The door opened abruptly and mother's relative leaned into the study, supporting her bulk on the handle, the edge of the scarf around her head dark from perspiration.

- We've finished, Adelaide, she heaved. Are they the shoes?

She took them from me and tucked them under her fleshy arm.

- The hurt will pass, my boy, she said, patting my cheek with a moist hand.

- We'll discuss thing later, mother whispered.

The burnished floorboards creaked as she followed her relative out. *i* stared at the fireplace, then walked to the chair behind the desk. *i* touched the outline of father's head in

the upholstered backrest: it was warm from the sun. The articles on the desk caused a swell of emotion. From his favourite pipe, *i* tapped a little ash onto my palm, stared at it for some time, then wrapped it in a handkerchief. *i* dipped my finger in the inkpot: it was dry. Eyes closed, *i* leaned back and felt as though *i* were dissolving in liquid light.

The coffin stood in the middle of the dining room, mounted on trestles, with five candles on a stand at either end. The flames prodded the darkness, drove it to the corners of the room. The window were open, but the curtains were still, and the air was heavy with coffee, candle smoke, acrid body odour. As the clock chimed eleven melodious notes, the mourners, who sat on chairs against the walls, stirred, coughed, rattled cups. The oppressive silence was occasionally relieved by someone whispering a consoling word, or relating an anecdote about father's good character. *i* sat next to uncle, who advised me several times to go to bed, as tomorrow would be very tiring. Drowsy, *i* was determined to pay my last respects to father by staying up all night. Alfred had been sent to a relative's place, while Nathalie dozed on mother's shoulder. To ward off sleep and to make the dreary faces more bearable, *i* thought about the memoir *i* had submitted to the Academy. It had been a month, and *i* had heard nothing. What would Cauchy think of my findings? Would he judge them the work of real talent? A professor at the Polytechnic, would Cauchy take me under his wing and nurture my talent? Perhaps when all this was over and *i* returned to Paris, *i* would find the letter with the Academy's seal, informing me that my mathematics was so advanced *i* would be granted entrance to the Polytechnic without sitting for the examination.

A woman left the room, and the candles quivered, strained after her. My thoughts returned to the coffin, and once again *i* questioned my work. What was the use of mathematics? Where was its comfort? Its consolation? That human touch that might help lighten this night? But mathematics had nothing to do with death, its spirit denied death. Had Pascal turned away from mathematics because it did not confront death? Mathematics or Christ? One promotes eternity through the mind, the other through death.

The candles blurred, merged into a single flame, transformed the room. The coffin's lid was open. *i* stepped forward and looked inside: it was full of rods with gears, numbered dials, small wheels and sprockets. The soul of man, *i* thought, standing calmly. Pascal appeared from the furthest corner of the room. Diversion, he said in a weak voice, knocking on the calculating machine with his wrinkled knuckles. Like all art, mathematics was nothing more than a diversion from the fact of our mortality. Yes, he had indulged in it, imagined that he was serving truth, even constructed this machine. But he had only been placing screens between himself and the true source of enlightenment: death. He closed the lid and lay on it, head resting on his hands. Diversion, he said, looking up at a dome covered in stars. In order that man might avoid confronting the human condition. One man was diverted by the pursuit of power, another by passion for women, a third by the practice of gambling. But there was also diversion in knowledge, when it was motivated by a desire for fame and self-advancement. How many mathematicians would pursue the abstractions of algebra if they experienced the fact that death reduced us all to the lowest common denominator?

My head jerked from uncle's shoulder. Sitting more upright, *i* reprimanded myself for the lapse. Pascal's words come back to me. No, mathematics wasn't a diversion for me. There was too much of the priest in Pascal when he wrote his *Pensees*. His faith was a diversion. He was a sick man, and his faith helped him bear his ailing body. No, *i* wouldn't let father down. This would be my night of Gethsemane. *i* would watch over him, confront death, father's death, the person *i* loved most, not with Pascalian faith but with the spirit of mathematics. And for the rest of the night *i* was caught in a struggle between sleep and vigilance, between deliverance and despair, between coefficients and the coffin.

{We know that the sum of terms of the same elliptic function}

i could have expressed this better. What *i* meant was the sum of elliptic integrals of the same species. My thoughts have always been too quick for my hand - that's been a problem all my life. The mind so swift, the body so sluggish. Leave it. Let it be a challenge to future editors of my work. A test to see whether they are able to keep up with my thoughts.

{always reduces to a single term, plus algebraic or logarithmic quantities.}

My feelings for her grew in proportion to the horrors ravaging the city. The disease spread rapidly since the first case, and the papers were now reporting a thousand deaths a day. Despite this, people's spring-time enthusiasm hadn't been dampened by the epidemic: the theatres were still full, entertainers were everywhere in boulevards and streets, shop-windows with figures and paintings depicting aspects of the epidemic were surrounded by crowds who laughed, jeered, made faces at the disease. My health improved, the cough had eased, but *i* lacked the confidence to approach her in the courtyard, to visit her with d'Herbinville. *i* spent hours at the window each day, watching, waiting to get a glimpse, daydreaming of the right moment to meet her again. One afternoon, knowing how miserable *i* would be if another day passed without speaking to her, *i* took one of my memoirs and left the room. *i* had seen her go out an hour before, so *i* waited near the front gate. A wagon ground past the sanatorium, heavy with its freight of corpses from last night. The breeze ruffled its black draping. As she neared the gate, *i* made that *i* was going on urgent business.

- Good morning.

She looked up, surprised. My greeting had been too abrupt. There was no turning back now: courage had to overcome caution. Trembling, her gold earrings gleamed. Was *i* going walking again? Prison had given me an appetite for the sun. *i* should be careful, she said with real concern. The disease was spreading. Her tone encouraged me. *i* had read in the papers that it wasn't contagious.

- You'd be safer joining me in a cup of cocoa.

My heart jumped at the invitation. As we climbed the steps to her front door, her dress rustled, revealing white-stockinged ankles. In the sitting-room *i* reminded myself on the need for restraint, and that *i* mustn't reveal my feelings too soon, not until *i* knew how things stood between her and d'Herbinville. She removed her bonnet and a wealth of golden hair spilled onto her shoulders. Returning with the cocoa, she sat directly opposite me, and the shadow of her head lay on my lap. She spoke about her music: she was studying the piano and hoped to teach it. *i* told her about my mathematics, my rejections and misfortunes.

- Music and mathematics go hand in hand, she smiled, looking directly in my eyes.

My cup and saucer rattled as *i* turned to the piano in the corner. What did she mean by that? Was it a hint of...? A dreadful disease, she said. And there was no telling how long it would last. Though some maintained it wasn't contagious, her father had heard of a case where a young man transmitted the disease to his fiance through the act of kissing. How horrible! A moment of such tenderness to be the cause of misery and certain death. And it was so unpredictable: afflicting the young and the old, the strong and weak, the rich and poor. And not only was little known about the disease, but the methods of treatment varied, though her father was of the opinion it was best treated by opiates and systematic blood-letting. Despite the conversation's morbid nature, *i* felt buoyant, my doubts and fears were dispelled

by her clear, rhythmic voice. She asked if *i* would like to hear her play the piano. *i* swallowed my yes. Was this a sign of...? Would she have extended my visit if she weren't comfortable with me? It was more than politeness - *i* could tell from the tone of her voice. And she was no flirt. Living here, she had been touched by the suffering of others, saw through the trappings of beauty, position, wealth. She could relate to those who lived for ideals, who suffered, who were rejected by society. The tune she played was further proof of her noble character: it wasn't a toe-tapping polonaise or polka, but a slow, almost melancholy piece. *i* wanted to be caressed by her sunlit fingers, the way she was caressing the keys. *i* wanted to be carried away, as *i* had been by my passion for mathematics, and later by my love for the Republic. Restraint. What about d'Herbinville? Why hadn't she mentioned him even once in the course of our conversation? Surely if there were something between them, she would have made it known in order to dampen my interest, which must have been evident by now. Was he nothing more than a family friend? And if he was courting her, what did her silence about him mean?

The final chord filled the room, passed through me like a ripple through water. She closed the piano's lid. *i* stood and held out my cup. Our fingertips touch. Summoning all my courage, *i* looked into her eyes. But *i* must have disconcerted her, for she blushed and turned to the table. Restraint. There was plenty of time. *i* thanked her for the cocoa and asked if *i* might visit again.

- Of course. Pecheux will be away for a month.

- A month? Where?

- London. To purchase gunpowder.

i was taken aback: was the Society planning another revolution for the coming summer?

- No, she laughed. For his business - firecrackers are in great demand.

i had never been so happy. It was as though *i* was hearing the sound of my own laughter for the first time: a voice no longer closed and suspicious, but open as the spring sun filling the room.

{There are no other functions having this property.}

Splinters of sunlight darted from the hearse's silver trimmings. Mother secured her veil against a hot, blustery wind. She whispered that there were a lot of surly faces among the mourners and hoped they wouldn't start anything. *i* walked on one side of her, uncle on the other. Listless from a sleepless night, *i* was drawn by a force beyond my control. The bell tolled wearily. We stopped before the church and the pallbearers raised the coffin onto their shoulders. The crowd that had gathered on the steps parted to allow the procession through.

- He was a good man, said an old fellow.

- A real Republican, called another.

- We'll avenge his death, shouted a third.

- Down with the Jesuits! yelled a fourth.

The comments roused me, dispersed the foginess in my head. Rabble, mother hissed. They had no respect for anything. But the determined look father's friends and supporters moved me, aroused my anger.

- We'll show them, Alfred whispered in the cool nave.

His word were swallowed by the organ's lugubrious groan. The nave soon filled with flushed faces. As the priest strode to the altar, a deep groan trailed away, and a murmur passed through the congregation. Adjusting his collar, the priest nodded to those in the front

pew. *i* clenched my jaw. Mother raised her veil. The mass was conducted against a background of persistent whispers. Several times the priest stopped, wiped the back of his neck and eyed the loudest offenders. When he concluded a relative stood up and asked if he might deliver an eulogy. The priest replied it was inappropriate in the present situation.

- Eulogy! Eulogy! A few voices chanted from the back.

- You're in the house of God, protested the priest.

Another group began hissing at the Eulogists, calling on them to leave the church.

- Hypocrites! shouted a youth from the back.

- I didn't want this, whispered mother.

- It had to come, *i* said.

She gripped my hand, but *i* pulled it away, feeling her nails. The exchanges between the rival factions were becoming more heated, with people standing and hurling abuse at each other. His calls for piety unheeded, the priest turned to the organist and indicated fortissimo with an upward gesture of his pink palm. A massive groan overwhelmed the nave, causing many to stop their ears.

- You won't silence us!

- We did it in '93, and by God we'll do it again!

- Down with the Jesuits!

- What are they doing, Evariste? cried mother.

- Revolution! yelled a robust youth.

- Now! bellowed another youth.

A volley of white stones struck the organ's pipes. The old organist leapt from his seat and ran for cover. As a chaotic melody chimed against the dying groan, the priest raised his arms and demanded everyone leave the church. Glass shattered: where there had been small stained window depicting the stoning of a martyr, there was now a circle of clear blue sky.

- Desecrators! Demons! the priest shouted from the pulpit.

He grimaced and covered his left temple with both hands: blood oozed between his fingers. The congregation scrambled between the pews, pushing and screaming as they went. The factions attacked each other, first with abuse, then obscenities, finally with fists. Half a dozen youths, the stone-throwers, leapt over the pews and surrounded the coffin. Alfred joined them.

- We'll bury the mayor, shouted the robust one.

The others took up the cry, and raised the coffin onto their shoulders.

- No, Alfred, mother shrieked. Stop him, Evariste.

But the young pallbearers had already pushed their way to the back of the nave, where they were confronted by another group of youths.

- Atheists! burst the leader.

- Out of the way, Alfred demanded.

The pallbearers charged through, but the others stood their ground, and the coffin tilted precariously. Brushing past mother, who had turned white as the marble altar, *i* shoved through the crowd, in time to help secure the coffin from falling. The obstructors were soon pushed aside by opponents at their rear. Finding myself at the head of the pallbearers, *i* led them out into the dazzling light, where we were greeted by a resounding chorus of Liberty or Death. *i* felt a surge of strength at the sight of hundreds of people chanting support: strength from a feeling of solidarity, belonging, being a member of a group. It was as though the crowd had rushed in and filled the vacuum left in me by father's death. *i* felt close to those Republicans - a closeness *i* had only experienced in father's presence - and *i* came away from the burial with a different view of mathematics: *i* would honour father's memory and avenge

his death, through both thought and action, symbol and sentence, ink and blood.

{But absolutely analogous properties are displayed by all integrals of algebraic functions.}

Was it right? Happiness in the midst of so much suffering and death. The question gnawed me as *i* returned to the sanatorium from police headquarters, where *i* had to report every second day. *i* knew better than to walk through the quarters surrounding the Hotel de Ville, where the epidemic was most rampant, but *i* was almost drawn there - not by a perverse curiosity, but from a need to test the strength of my happiness against this universal suffering. All around, victims were being carried to hospital on litters and mattresses, with the spring sun on their livid faces, and blossom-scent mingling with the stench of diarrhoea. Lanes were pungent with chlorine, which was thought to clear the air of pestilence. There weren't enough hearses to carry the dead, so cumbersome artillery wagons were used. Lacking springs, they jolted the coffins, bounced them dangerously, filled people with dread. *i* was walking behind one, savouring the fragrance of pine, when it struck a cobble - sixteen coffins crashed onto the street, and *i* was lucky not to be hurt, even killed.

The misery couldn't dispel my happiness: her face was like the sun in this dismal purgatory, her gentle voice rose above mourners crying and wailing, her musical hands were a source of hope in the midst of this horror. She led me forward, to a cleaner world, away from sickness and death.

A church bell tolled above a square where a crowd gathered around a ragged speaker standing on a parapet. It was a plot meant to destroy the poor, he shouted. Cholera! Never believe it! There was no cholera. It had all been the work of the authorities. The deaths were due to poison! Cholera was just a cover up! At that moment there were people prowling the city, stalking the markets, the wine shops, the very drinking fountains. People carrying phials and packets of poison to contaminate food and drink. Paris was overpopulated, the authorities want to rid the streets of the poor. What better way than announcing there was a cholera epidemic? Beware! Take nothing for granted! Examine everything before eating and drinking. In a public-house one should check the wine, make sure it hadn't been laced with poison. At the fish-market one should inspect the trout, make sure it hadn't been given a dose of something lethal. It had happened before his very eyes at the butchers' stalls this morning: a fellow sprinkled pink powder on a tray of sheep tongues. No sooner had he been caught than he broke loose and disappeared, but not before a few people identified him as a police informer. Trust nobody, he warned his listeners. If they saw anyone acting suspiciously, they owed it to their family and friends to act. Look at that youth over there, he said, pointing to me. *i* had been leaning on the well for some time. What was *i* up to? What did *i* have in my pockets? In an instant *i* was surrounded by snarling faces. The speaker leapt from the parapet and confronted me. What was *i* doing standing beside the fountain? The crowd had been stirred to the point of panic. *i* was afraid they were going to attack me. Her clear face flashed to mind and for an instant her arched eyebrows reminded me of two swallows in flight. *i* was on my way home, *i* said, struck by the irony of the situation. Just as a little hope had stirred in my heart, just as *i* had started to feel alive again, this crowd was glaring at me as if it was after my blood.

- Home? sneered the speaker.

Then why was *i* loitering beside a public drinking fountain. Didn't *i* know that just yesterday a fellow not much older than *i* had been set upon and torn to pieces by a mob on the Rue Ponceau. Why? Because he had stopped to look into a wine-shop. Was he a poisoner?

People didn't ask - they finished him off and threw him in a canal.

- Search him, a woman shouted.

A few men went through my pockets.

- On your way, growled the speaker.

And next time *i* mightn't be so lucky, he shouted after me. Last week a man had been killed in St. Germain for carrying a bag of white powder which had turned out to be nothing more than camphor.

{We treat at one time every integral whose differential is a function of a variable and of the same irrational function of the variable, whether this irrationality is or is not a radical, or whether it is expressible or not expressible by means of radicals.}

i saw her almost daily since my first visit, but *i* hadn't as yet told her of my feelings. *i* was happy just being with her: walking with her, listening to her play the piano, sitting in the living room, even when one or both parents had been present. Before meeting her, *i* had looked down on the trivial conversations of others, now *i* was interested in everything she said: whether it was about the new spring fashions or the novel she had just finished reading - Scarlet and Black. *i* told her *i* had met the author, and that his real name was Henri Beyle. Her golden eyebrows contracted, as though in disappointment, when *i* pointed out that he was bald and overweight, but she praised his insights concerning love, and insisted *i* read it. Of course *i* took the book, even though *i* didn't like novels. It would give us another subject for conversation, - a topic on both our minds.

By the end of April *i* had served my sentence and was free to leave the sanatorium, to settle anywhere in Paris, return to Bourg-le-Reine if *i* chose. The doctor was certain the epidemic would abate with the warmer weather, and he advised me to remain at the sanatorium for another month, as a matter of precaution. He had no doubts that d'Herbinville would meet the cost. *i* needed no coaxing. *i* wanted to be close to her, to see her as often as possible, to watch her from my third storey window as she stepped lightly across the courtyard on her way to piano lessons. Did she feel anything for me? Why had she smiled like that in telling me d'Herbinville would be delayed in London until the middle of May? *i* had to tell her how *i* felt, before his return.

{We find that the number of distinct periods of the most general integral relative to a given irrationality is always an even number.}

Death's wagon rumbles past the sanatorium, dragging its heavy chains along the cobbles, drawing me to the window. It hasn't come for me though - these vehicles are for cholera victims: they creak out in the dead of night, so that the sight of them will not exacerbate people's anxiety, and yet the sound of their chains on the quiet streets is chilling. Here and there at crossroads, in courtyards, fires are flourishing, meant to purge the air of pestilence. Shadows flit like bats, hurrying either to avoid death, tend to the dying, or make arrangements for the dead. Across the street a red lantern shines above a gaping doorway.

{Any sum of terms whatever reduces to n terms plus algebraic and logarithmic quantities.}

Grief, a week of it, unrelenting, blackening, numbing. *i* was on my way to the Polytechnic, to sit the entrance examination. Grief, made more bitter by the sophistication on the wide boulevards: the perfume, powder, coiffure, fashion, the striving after wealth - all an elaborate attempt to conceal the stench of mortality, allay the fear of death through diversions, entertainments, games of love and profit. *i* turned into a working-class suburb, where grief was made more bearable by the squalor, poverty, misery. Here, death couldn't be concealed by finery: just as it gnawed at my heart, it haunted the eyes of the woman emerging from a basement, settled in the lungs of the hawker whose raucous call for old clothes sounded like a cry of help, rose from sewers and overwhelmed the scent of jasmine adorning window-sills, palled the sky with soot and smoke. A week, already? *i* had lost all sense of time. The calendar and clock had no place in the depths of grief, just as they had no place in the heights of mathematics. The tenth of July - yes, it had been a week to the day.

A woman was cleaning fish on the edge of the pavement. She deftly scraped the scales, slit the gleaming body and flicked the entrails into the gutter. Flies swarmed over her sticky hands. Silent as its shadow a cat slinked forward. As the serrated knife tore through flesh, *i* reproached myself for having thought that father had betrayed me. Dark forces led a person to such an act: forces which defied society, reason, love. A pedestrian bumped me: a young fellow with a cap tilted cockily and twirling a chain around his forefinger.

- Watch where you're going, schoolboy.

The frenzied flies now blackened the woman's hands.

- Cat got your tongue?

Fish glared, howled mutely.

- Get going, scowled the woman.

Tipping his cap over his eyes, the fellow wished her a good day and strolled off. Before *i* could thank her, she picked up her basket and left.

Cursing, a man prodded a pair of oxen straining with a marble cube. *i* was in a bustling square, with numerous speakers on crates and stools. Wearing top-hats and holding parasols, arm in arm, step in step, couples promenaded between the speakers. Vendors barked their wares. Caps at cocky angles, eyebrows arched slyly, young men whistled as they strolled. Barefooted street children scurried after scraps. Two small boys were quarrelling over a lace handkerchief. A gendarme appeared, snatched the handkerchief, sniffed it with an approving nod and scattered the boys with a wave, as though they were sparrows. *i* stopped in front of a speaker wearing a worker's jacket spotted with blue stains. Jugular swollen to bursting, he growled over his listeners, many of whom wore similar jackets, pointing here and there with a blackened forefinger, complaining that their trade had been exploited long enough! Others prospered, grew powerful, made a name for themselves, while they sweated in dark basements, working for a pittance, unseen, unheard, unappreciated. Enough! Enough, those around him echoed. Inkmakers were the fountain of life, and the authorities knew it. Strike!

- Strike! Strike!

If only *i* were as fluent in public speaking. My thoughts leapt with a logic of their own, often too quick to be grasped by words, and *i* became tongue-tied, sounded obscure. *i* envied the speaker: his ability to arouse people, inflame them with ideals for which they would sacrifice themselves, and all this with nothing but common words. Would mathematics ever have that effect on an entire crowd? And my theory of equations? Would it ever be delivered in a way that inspired people to sacrifice themselves for the sake of the Republic of mathematics?

He advised them to stop production until the government agreed to increase the price of ink. The city would be reduced to chaos without it. He pulled out a wine bottle from his jacket, uncorked it with his teeth, and turned it upside down: a black stream gleamed as it spilt onto the cobbles, causing those in front to jump back. Ink! Society's lifeblood! If the quill was mightier than the sword, they were mightier than the quill. If they spilt their supplies onto the street, the government would soon enough bow to their demands. Blood and ink! There was no more explosive mixture. If they went on strike, the government would be sure to relent, to avoid crippling itself, for all governments exercised their power through ink. Not only this, it would be forced to contend with the wrath of journalists, writers, poets, academics, and its strongest ally the Church. Strike.

- Strike! Strike!

Was ink also the lifeblood of mathematics. What if mathematicians were suddenly unable to record their findings? Would there be a body of mathematics without ink? Maybe too many mathematicians had already become too dependant on ink, and this dependence had weakened their imagination and ability to think abstractly. If ink were scarcer, they might be compelled to work entirely in their heads, and mathematics might be restored to its ideal state. They might even develop a faculty for communicating with each other through thought alone, or... What was that under my shoes? *i* had stepped into the pool of ink. *i* glanced over my shoulder: bold footprints followed me faithfully.

The walls of the Polytechnic were covered in political graffiti. Had it been there last year? Students, vendors, beggars milled around the entrance to the courtyard. A young woman with a basket of bread sticks strapped to her waist approached four students. Man lived by more than bread alone, winked one of the students. He bought a stick and broke it into quarters for the others. A few grey pigeons swooped on the crumbs, and as they pecked the cobbles a rainbow gleamed around their throats. A beggar in an army greatcoat pounced at them with startling agility. Catching one by the tip of its wing, he stopped its wild beating with a deft twist of its neck. A few women were sweeping the courtyard. Again *i* tried to concentrate on the examination, but it had been rendered less urgent by the grief and chaos of the past week. A scrawny broom swept my shadow, together with a clump of dry horse manure. In climbing the steps, *i* noticed a painter whitewashing a section of wall, vigorously obliterating a red circle. Was it a numeral, perhaps part of a year? Or a letter, perhaps the second in the word death?

{The functions of the first species are those for which the algebraic and logarithmic parts are zero.}

Summoned, *i* had gone to Richard's apartment reluctantly. His living room was hot and stuffy, the setting sun highlighted the engraving of the melancholic muse of mathematics. The maudlin figure with long tresses angered me. Wallowing in a swamp of petty emotions, what did she know about mathematics? Real melancholy was a yearning for the ideal, a desire to know everything, the sadness arising from having glimpsed the infinite. In the square above her head the digits from one to sixteen had been arranged so that the rows, columns, diagonals, four-celled subgroups in each corner, all added to thirty four. But this square was in turn a sub-cell of an infinite square consisting of all the digits from one to infinity - a square whose infinite rows, columns and diagonals all added to the same number. Melancholy: the awareness that there was neither time nor space to convey to others what one had grasped in a flash.

- You should've taken my advice, Evariste, said Richard. You were in no condition for

that examination. I could've arranged another time. Instead, you've gone and ruined everything.

{There are n distinct functions of the first species.}

There was a different examiner on the second occasion: an elderly man who introduced himself as Binet or Dinet - a cavalcade passing beneath the window at that instant made it difficult to hear. his name He invited me in with a glistening smile and pointed to a chair placed in front of a blackboard bright with sunshine. *i* sat with a feeling of indifference verging on numbness - *i* knew how much rested on this examination, but the week-long grief had drained me of strength, and there was now a vast emptiness in my being which not even the Polytechnic could fill. And yet here *i* was, facing an examiner who would determine my fate. *i* was in no condition to concentrate on anything, and my verbal responses could be a little incoherent at the best of times. Why had *i* come? Why hadn't *i* take Richard's advice and made a request to be assessed at a later time? What dark force had compelled me to act so unreasonably? *i* couldn't say, and even now, almost three years since that day, *i* don't know. Perhaps it's the same dark force that keeps me in this room, that makes it impossible to do what's reasonable and in my best interest. After a few preliminary questions, the examiner squinted over the top of his pinc-nez and asked if *i* was related to the mayor of Bourg-le-Reine. The question prodded me. Suddenly *i* didn't like the way he pursed his fishy lips: it was a sign of Jesuit sympathy. *i* was standing before the Grand Inquisitor, staring at his ears made crimson by the sun beaming from behind. Other questions followed, all directed in a pointed manner, all intended to unsettle me. From the back of the room the secretary's quill scratched the proceedings. *i* stumbled on a question on higher trigonometry. He advised me to relax. *i* managed to scramble my way to an answer. Was that a smile or sneer? *i* didn't need his condescending tone. In the case of a cyclic quadrilateral what could *i* say about the angles at the circumference and the angle subtended at the centre? *i* could see the construction, knew exactly what was required, but, in order to answer, *i* had to overcome a sense of resentment that drew me toward silence. The room swayed from side to side in the clock's silver disc. Directing me to the blackboard, he asked me to erase some work from the previous candidate - a solution to a quadratic equation containing imaginaries. *i* wiped slowly, reluctantly, erasing symbols from my shadow, reducing them to dust swirling in the light, until my shadow was bare - except for the faint $i = \sqrt{-1}$ which *i* couldn't bring myself to erase from the shadow of my head. He asked his question, but by now *i* hated the way he picked at the back of his head, hated his grin. This time *i* couldn't overcome whatever it was that pulled me toward silence, even though *i* knew that silence meant failure and never entering the Polytechnic. *i* felt the dust on the eraser. Should *i* throw it in his face? This examination would go down in history. The old man who failed Evariste Galois would fare badly with biographers. This incident would become a legend. There was no telling what this failure would precipitate. If this Dinet or Binet hadn't mentioned father, if he had asked his questions properly, *i* would have answered them, entered the Polytechnic, produced a substantial amount of work, lived to seventy, but as it was...*i* tossed the eraser on his table - it slid off and left a dust mark on his black coat.

{The functions of the second species are those for which the complementary part is purely algebraic.}

Richard advised me to salvage something from the disaster, sit the Baccalaureate

examinations in December, go to the Preparatory School, become a teacher of mathematics. Teach mathematics? Never! The Preparatory! That second rate institution! Six years in one prison, and he wanted me to go next door, which was nothing more than an extension of Louis-le-Grand. Never! Denied entry to the Polytechnic, *i* wouldn't spend another two years in an institution that crushed freedom, where students were forced to bow to a curriculum controlled by Jesuits. They wouldn't get away with it, *i* said, going to the window. Who? Get away with what? The Jesuits and Royalists. They had conspired against father, and they were now conspiring against me. That old examiner was one of them. He had been determined to fail me in order to prevent a Republican from entering the Polytechnic. Richard ordered me to sit down, but my rancour grew at the sight of the Preparatory on the other side of the high wall. Two years in that place? Never! He had warned me, he said, flicking sharply the counters of an abacus. But *i* wouldn't listen. And now *i* was talking sheer nonsense. *i* flattered myself too much in suspecting there had been a plot against me. Conceit and inflated pride; *i* had better curb those tendencies if *i* wanted to get on in the world. *i* had mathematical talent, he couldn't deny that, perhaps genius, it was too early to say. *i* shouldn't squander it on the turmoil of politics. *i* should root out resentment from my heart and set my mind on entering the Preparatory. *i* could still become a mathematician, perhaps a great one, and, who knows, one day *i* might still be granted a professorship at the Polytechnic. Revolution, *i* said. *i* refused to be a mathematician in a prison, and Paris would continue to be a prison unless Charles and the Church were overthrown.

- Enough, Galois! he snapped, tossing the abacus aside. I know you've just lost your father, but that's no excuse for your own shortcomings. Go and think seriously about what I've said. We'll talk again when you've calmed down.

{There are n distinct functions of the second species.}

Intuition? A sixth sense? What exactly is this faculty *i* possess? Let those who doubt the existence of such things consider the last statement. In a thought lasting no more than a fraction of a second, tremulous as a soap bubble reflecting the world, *i* apprehended the full beauty and significance of elliptic integrals, even though they're a relatively new species and little is known about them. If only *i* had the time and the language to express this insight. Thought and language - at times the two are separated by a gulf of silence. At present this species of integrals is still nothing more than a seedling, and yet *i* have had a glimpse of the wonderful fruit it will produce. Who knows, it might take another twenty five or thirty years before someone comes along and, quite independently of my work, plucks the fruit of the tree.

{We may suppose that the differentials of the other functions are never infinite}

Resentment, hatred, anger: how could *i* feel anything else after what *i* had just been through? Not only father's death and my failure to enter the Polytechnic, but *i* had also been gnawed by the Academy's silence. Eight months since *i* had submitted my work, and still not a word! As far as *i* knew the two memoirs were still with Cauchy, who was to have submitted a report on them to the Academy in January, but which he deferred from doing until its next sitting. A week after that sitting: nothing again. When *i* visited him, he advised me to rework my papers, combine them into a single memoir, and submit them for the Academy's annual Grand Prize. Was this his way of dismissing me? The way he had dismissed Abel? My

suspicions about him were confirmed the other day: *i* learnt that he was a staunch Royalist, a devout Catholic, which explained the silver crucifix on his desk. *i* couldn't hope for fair treatment, let alone support, from such a person. And his advice? Should *i* submit my work for the Grand Prize anyway? Yes, if for no other reason than to spite him and his kind. But could *i* contain my hatred and anger? Could *i* concentrate on work? Recent events had exiled me not only from the Polytechnic but also from my inner world of mathematics - a place of order and harmony, that defined me, gave me meaning, where *i* had felt most at home. Touched by death, *i* was now estranged from that world. And more than once *i* was chilled by the thought of never entering it again.

{except once for $x = a$,}

They were down in the courtyard a few hours ago, saying good night. Her laughter rose above the scatter of horseshoes. d'Herbinville would go home, have eight hours sleep, and wake sharp and ready. And *i*? The flame stirred. Was it my breath? *i* sensed as a presence in the room. A shiver went through me. For some reason *i* gathered my papers scattered over the table and looked around. What was happening to me? Was *i* losing my nerve? Was *i* afraid of tomorrow? There was no heaven or hell - only a soggy, nameless ditch. Extinction. *i* clutched my papers, as though they were my very soul. Where was my resignation? What was this presence pervading the room? *i* had felt it throughout my life: someone hovering over me, observing me, listening to my thoughts, recording things for posterity - an anonymous biographer who would redeem my life through ink. The presence was now stronger than ever, listening to everything, like a confessor behind a fine screen. Past, present, future - that was an old way of looking at things, a remnant of a flat earth. Perhaps a new consciousness would arise where those tenses were obsolete, a state that would accommodate grammars like: *i* died yesterday. Time wasn't a series of discrete points: it was a wave function, continuous everywhere, each instant related to all others by the ultimate equation. Had *i* inadvertently summoned this presence? Or had it chosen me? The transcendence of thought! Here we were, in this coffin of a room, on this warm May night, and yet physically we were probably centuries apart, probably living in different languages.

{and moreover, that their complementary part reduced to a single logarithm, $\log P$, P being an algebraic quantity.}

As we left my room on Rue des Bernadins, where *i* had taken up residence shortly after my acquittal, Chevalier asked how *i* would survive without mother's support. *i* didn't know, but *i* wasn't returning to Bourg-la-Reine, not after the last incident with her on the morning of my arrest. She had betrayed father, and she would betray me for the sake of the Jesuits. Awaiting my trial in prison, *i* brooded over these thoughts, and my mistrust of her grew to a kind of misogyny. Alfred and Nathalie had visited me in prison on two occasions, and they informed me that she demanded an unconditional apology. Never! *i* would live without her. According to Alfred, she was just as determined to sever herself from me. And the rent for the room, Chevlaier probed. d'Herbinville was helping me, *i* replied, holding my breath against a cart filled with carcasses. What did he want in return? Clean-picked ribs, gleaming thigh bones, smooth ball and socket joints gleamed in the sunlight.

- Judge your Saint-Simonist first, *i* snapped.

He should condemn that lecher *Enfantin* before insinuating things about honest hard-working Republicans like d'Herbinville. What did he want from me, anyway? Was he still

trying to recruit me, was that it? Was *i* ripe now that *i* was free and without prospects? No, he protested, visibly hurt by my comments. He believed in my talent. Maybe there was a touch of selfishness in his motives: maybe he wanted to be remembered by biographers as the person who saved Galois from oblivion. He always did this to me: just as my hope in mathematics was on the verge of turning to dust, he would come along and remind me of my talent. *i* apologised for harshness.

- Have you heard from Poisson? he asked.

- It's been four months, and nothing.

- Why don't you go and see him?

i would think about it, *i* said, though more from a feeling of gratitude than anything else. After some coaxing he managed to talk me into visiting the Salon, where artists were displaying their latest paintings in the annual exhibition. On the way *i* felt the embers flickering again. Perhaps he was right: Poisson could well be my last chance to a career in mathematics.

- All Paris is talking about it, said Chevalier.

- Talking about what?

Hope! So easily extinguished, so easily revived - a word, a breath, and it was aglow again. *i* was already making plans to visit Poisson. Chevalier was talking about Delacroix's new work *Liberty leading the People*. The colour and composition were something to be seen. Romanticism had found full expression in his work. The artist had captured the courageous spirit of the July Revolution. Was he a Republican, *i* asked. It seemed so. Had he been at the barricades? One critic had already attacked him for not having experienced what he has painted. Then he was a parasite, *i* said. Exploiting the revolution! When he sold the painting, would he give the proceeds to the widows and orphans? No! He would live well, dress fashionably, and mix with those who can afford to buy paintings. The high life at the expense of those who died! It was obscene.

- They say Louis-Philippe wants to buy it for the Palace.

i spat into a murky canal. In a nearby workshop a man was guillotining sheets of paper. Our King was no fool. He was determined to cultivate the idea of the Citizen-King. He would buy the painting to show his supposed affection for the people. It was all pretence. Scandalous. Delacroix was an opportunist. A true Republican would never allow his work to enter the Palace, not until the Palace became a public museum.

Of the hundreds of paintings in the Salon, Delacroix's enormous canvas with its larger-than-life figures attracted the greatest bustle and excitement. We pushed past rustling dresses, clouds of cigar-smoke, mixed reactions.

It hadn't been like that at the barricades, protested a stubbled man with the grey hands of a stonemason. The tradesmen were the real heroes of the Revolution. Delacroix should have left the safety of his atelier and gone down to the streets. If he had seen the fighting with his own eyes he wouldn't have painted that top-hatted bourgeois as the hero of the moment. Shame on him! He had cheated the people! His painting would give future generations a false account of those three glorious days.

Sensationalism, exclaimed another, with a red cravat to match the colour of his face. These Romantics had lost all sense of harmony! They were obsessed with death and destruction. One look at that figure was enough to highlight the excesses in the work. Raising a silver-tipped cane, he pointed to a man lying in the left foreground, naked from the waist down. Why had he been depicted there, and in that state? There had been corpses, many of them, on both sides, but had any been stripped naked like that? What was Delacroix's intention? Did he wish to shock? Display his virtuosity in depicting the naked body? Well, he

had failed on both counts.

Delacroix would no doubt create a myth around the gamin, commented another, in a black frock-coat buttoned to his chin. He would have future generations believe that the Revolution was led by street urchins. Look at that rascal: a pistol in each hand! The real hero of the moment. The painting should have been called *An Urchin leading the People* - after all, the little rogue was one step ahead of Liberty. There was nothing noble or innocent in those little savages. Vermin! That was what they were! Forever pestering and picking the pockets of honest citizens. It was an outrage to glorify them like that! He could just imagine what the little devil was thinking. He was thanking Delacroix for putting these pistols in his hands. Let the gullible public believe he had been risking his life for the cause. The truth was, he had taken those pistols and that bag strapped over his shoulder from a fallen officer, and he was going to run down the first lane he came to and pawn them. That was what that little Romantic hero was thinking. He knew the minds of those street kids - he was forever driving the scavengers from his pastry-shop.

- What do you think, Evariste?

Liberty had the tricolour in her right hand, a musket in her left. She was broad hipped, with a red waist-band fluttering in the forward rush. Her rouged face was in profile: forehead and nose in a straight line. Her presence in the midst of the revolution grated me. *i* knew her function in the painting was symbolic, metaphorical, a personification of freedom - despite this, she didn't belong there. Her bright breasts detracted from those who fought and died. *i* had come hoping to experience the revolution, to see a faithful representation of those daring days, to project myself into events from which *i* had been excluded. But this work was nothing more than caricature! It lacked all feeling for the people, sympathy for their suffering and death. There was no place for symbols and female personifications in a moment when men were charging to their death. And what was his intention in showing her breasts? Who had he used as his model? A prostitute, no doubt! A prostitute leading the people, given centre stage, together with her protegee the gamin, while one of the true heroes of those glorious days, the student of the Polytechnic, was reduced almost to shadowy insignificance.

Our French girls weren't good enough for monsieur Delacroix, said a stout woman, prodding the parquetry with her parasol. What did she mean, asked her companion, rustling closer to the painting with a pair of lorgnettes. One could tell at a glance that he had used one of those Greek models who seemed to be popular with artists at the moment. In fact, he had used the same model to paint his *Orphan in a Cemetery*. Why foreigners? French girls were just as attractive. She was right, said the other, squinting up at Liberty. She had heard it said that monsieur Delacroix painted this for his country, because illness prevented him taking part in the revolution. If this was his contribution to the revolution, then it was only proper that he use a French girl.

i focused on the student, and my anger grew. *i* knew from the chef's account that the students fought in the front ranks, fearlessly leading groups of workers. Delacroix had depicted this student with the red and blue peaked hat of the Polytechnic, he had given him a sabre, but there was no glorious light around him. A small, frail figure, he was staring wide-eyed at the groin of a dead man, as though deliberating whether he should scramble over a pile of broken beams, rubble, bodies. He was represented as a coward, while the prostitute, who was probably entertaining clients during those days, was elevated to a goddess. The painting was slanderous! The students were the real heroes of the revolution. The workers were driven to fight in order to improve their desperate lot; the tradesmen, against high taxes; the bourgeois, to maintain their comfortable lifestyle; while the students fought for nothing other than the idea of a Republic.

- Well? Chevalier repeated.
- He has debased the revolution with that slut.
- It's only a painting.
- The student should've been in her place.
- Speaking of the student, he smiled. You didn't pose for him, did you?
- What do you mean?
- He bears a striking resemblance to you.

There was an instant of self-recognition, a fleeting sense of déjà-vu in the thin face whose anxiety was accentuated by long well-defined eyebrows. Didn't *i* think so? Perhaps, a little. Perhaps Delacroix had made a sketch of me, Chevalier added. Artists were always sketching faces for future works, often without their subjects being aware of what was happening. And *i* recalled an occasion in the coach on the way to Bourg-la-Reine, when a frail-looking fellow was sketching and darting glances at me. Was he Delacroix? And what if that student was based on me? Delacroix had unwittingly placed me in the situation *i* had longed to be in, from which *i* had been kept by Guigniault. Under different circumstances, the student could easily have been me: the Evariste Galois who passed the examination on the second attempt, who entered the Polytechnic, and fought in the revolution. That was neither uncertainty nor fear in the eyes of my look-alike: he was waiting for the moment to spring from the rubble, leap over the naked body, vanquish the monarchy, and race light-footed to a shining future.

{Denoting these functions by $\pi(x,a)$, we have the theorem:}

The apartment was hot and musty. Yellowing sheets covered the furniture. *i* struggled with the latch, opened the windows, and lay on the bed. Had father also stared at a brown patch of plaster on the ceiling on the day he died. During the last few weeks his features had started to become indistinct, as though fading from my memory. *i* found it difficult to summon his face. Now, *i* tried to see him in the patch, but mother's profile appeared instead. At first she had refused to give me the key to the apartment, but *i* flared up, demanded it, threatened to sleep on the streets. She threw it on the table, adding she didn't want me back until *i* learnt the meaning of respect. Alfred entered the study and insisted on joining me. It wasn't safe, she scowled. There had been too much violence on the streets of Paris. Violence was the only way to the future, retorted Alfred, his face blazing with pimples. He turned to me for support, but *i* avoided his pleading look. *i* didn't want him to study in Paris, though *i* couldn't tell him in so many words because he looked up to me. Violence, mother echoed in exasperation. That was all we know. God wouldn't endure it though. His wrath would thunder over Paris. It was all in Revelations.

- It will be the people's wrath, said Alfred. The thunder of the final revolution. Isn't that so, Evariste? It will shake Paris, crush our enemies, and clear the air of the oppression that's choking us. We won't be betrayed next time, will we, Evariste?

i nodded. Mother had twisted her chain into a single tight braid that cut into her neck. Turning abruptly, she went to a side table, picked up a Bible and flicked the thin pages. Armageddon, she announced. That would be the final revolution. It was all in the Bible. She read in that familiar tone of voice: And the seventh angel poured out its vial into the air, and there came a great voice out of the temple of Heaven, from the throne, saying, It is done. And there were voices and thunders and lightnings, and there was a great earthquake, such as was not seen since men were upon the earth.

- Revolutions, not Revelations, said Alfred.

He glanced at me, but *i* met his boyish enthusiasm with deliberate coolness. Revolutions were the work of Satan, she said, flicking the pages. We were being seduced by the Beast. She read again: And *i* beheld another Beast coming out of the earth, and he had two horns like a lamb and he spoke as a dragon and he displayed all the power of the Beast before him. And he performed great wonders and deceived them that lived on the earth by means of those miracles. That was our revolution, she declared. The second Beast! The one that promised paradise, only to cast people into hell. Mothers, Alfred sighed. They had no sense of history, no sense of the future - all they thought about was the welfare of the nest. If they felt the future as we did, they would scatter us with sweeping gestures, scatter us so we might grow and bear fruit and return a hundred fold all they had given us.

As father wouldn't be drawn to the patch of plaster *i* attempted to place myself in his frame of mind on that fateful day. Nobody had noticed anything unusual about him that morning. Perhaps he wound his watch before leaving his study, perhaps he tied a knot in his handkerchief, as was his habit when he needed a reminder that something important had to be done. He may have been a little more thoughtful, his step not so crisp on the cobbles, his voice somewhat flatter, but all that was nothing new. He had even gone to the tobacconist and bought a month's supply. He left the house quietly, just before noon, while mother was visiting her parents, telling Nathalie he was going to Paris on urgent business. He kissed her on the forehead, but there was nothing in that to intimate his intentions. But what exactly were his intentions when he boarded the coach? Maybe there was nothing but a black seed at the back of his mind. Maybe he set out with business clearly in mind. He may have been quite affable, discussed the price of wine with a fellow passenger. Maybe he looked out of the coach's window and noticed how the colonnade of poplars shimmered with bright-green leaves, filled his lungs with the fragrance of forest and field, and exhaled in a protracted sigh. But as he entered Paris that black seed grew, silently, without his awareness, still not quite a thought, still far from being a volition. He must have walked the streets as he had done countless times. Perhaps he bought a newspaper from a ragged boy, and looked forward to reading it over a cup of coffee. Perhaps he saw his reflection in the silver urn strapped to a vendor's back and decided to have a haircut before leaving Paris. In walking beside the walls of the College Louis-le-Grand, maybe he stopped for a moment, thought about visiting his son, who, at that very instant may have been gazing from a window, but decided not to distract him with an impromptu visit. And on the way to the apartment he was still unaware of the black seed germinating inside his skull. Or maybe by this stage the intention crossed his mind once or twice, but it was fleeting, absurd, something that desperate people did, people who had lost their hold on life, whose existence had become meaningless. Entering the courtyard, maybe he felt calm and composed, said good day to the officious concierge who just then was replenishing a lamp with oil. Perhaps he counted steps as each polished shoe scraped the winding staircase, smelt cabbage soup, thought of his favourite restaurant for lunch. And with each step, the seed grew, and by the time he reached the fourth floor it had become a conscious thought, just that, not yet a volition, not something he would carry out. The room was hot and stuffy. He struggled with the latch, opened the windows and lay down. And as he lay perhaps he looked up at the patch of plaster and saw the face of the town priest. But even then, as he got up and untied the curtain chord, he didn't know what he was going to do next. It was the seed, it had now become a black cloud that drifted inexorably toward him, that made him climb onto the window ledge, fasten one end of the chord to the window bolt and loop the other around his neck. And maybe, even at that instant, as he stood on the sill, perhaps he thought he wouldn't really do it. But the cloud suddenly overwhelmed him and he...

i removed the chord from my neck, jumped from the sill and ran from the apartment. In the middle of a busy square, *i* bowed over a fountain, gasping, dazzled by my shattered reflection. The panic attack subsided as *i* splashed my face and steadied myself on familiar sights: tricolour ribbons hanging from the branches of trees, masons replacing cobbles torn out for barricades, sweepers clearing the stinking garbage choking narrow streets. Everywhere workmen were repairing street lamps, glazing windows, restoring shopfronts, hanging up signs, changing the names of streets and buildings.

And if the panic struck again? Was that black seed really in me, or was it just my mind playing tricks? *i* entered a reading room. Holding the newspaper by its wooden spine, *i* rustled a few pages and read with little interest until *i* came across an article on the death of the Duc de Bourbon, Prince de Conde. He had been found a few weeks earlier - hanging from the bolt of a window! At first the verdict was suicide: after all, he was a Bourbon, and the recent fall of the Bourbon King Charles would have weighed heavily on him. But subsequent investigations had suggested murder. The coincidence astonished me. Those who had discovered the Duc's body reported that the face was pale, not blackish, as it should have been if he had died from hanging. His tongue did not protrude from his mouth, his eyes were closed, not open and bloodshot, the tips of his toes touched the floor. The knots in the handkerchiefs found around his neck could not have been tied by him, because his valets swore that he had been unable to tie his own shoelaces. The two candles in his room had been extinguished, not left to burn out. Why would the Duc have blown out the candles and, feeble as he was, walked across the cluttered room, climbed the chair and tied the handkerchiefs to the bolt, all in pitch dark?

On the street the thought that father may have been murdered began to grow and take a firm hold. After all, there had been no investigation into his death, no details. Why? Was he a victim of a conspiracy? Yes! Coming to Paris on business, he was stalked by assassins hired by his political enemies. They killed him and made it appear like suicide. The Jesuits were involved, and the Prefect of Police. That explained the lack of details. Yes! That was what had happened! There had been no black seed.

{ $\pi(x, a) - \pi(a, x) = \Sigma \phi a. \psi x$, $\phi(a)$ and $\psi(x)$ being functions of the first and of the second species.}

Thermidor: gift of heat. Thermidor: the eleventh month in the calendar used during the Revolution. Thermidor: from July 20 to August 18. It was the morning of July 26, and there was not a cloud in the sky. During the past three days the heat had been relentless. In the Preparatory's courtyard the cobbles shimmered, the white flag hung lifeless, students moved about lethargically. Just before eight, on my way to Physics, *i* was roused from Thermidor by a commotion in the corridor.

- Ordinances!

- Four ordinances!

- The King has imposed four ordinances!

Ignoring the bell summoning them to class, students gathered and discussed the measures taken by King Charles. *i* read the Moniteur over a student's shoulder and felt a flush rising to my face. The newspaper's ink glistened in the summer light. From here and there words buzzed like belligerent bees. He had dissolved the Chamber. Called for new elections. Revoked the Charter of 1815. Imposed conditions on the freedom of the press. A revolution was inevitable, *i* said. We had to organise the student body at once. We had to be on the streets when the first shots were fired, together with our brothers the Polytechnicians, the law

students, the medical students. But the majority didn't share my excitement: they appeared circumspect, apprehensive, uncertain of what the ordinances would bring. Paris had seen enough bloodshed, a student commented. He was too cautious, *i* countered. Daring! That was what the Republic needed. No more debates and negotiations! We would do best to remain calm for the time being, added another. He was against Charles, but he didn't want another Napoleon either. His father had died at Waterloo because of him.

- And the Jesuits killed my father, *i* snapped.

- I also say we wait, said another, stepping between us. Let's see what the liberal Deputies do, and the journalists - they're the ones directly affected by the ordinances.

- Cowards! *i* shouted, snatching the newspaper. You tremble at Guigniault's shadow!

Dashing out, *i* was momentarily blinded by the sun: its circle flashed at each blink. The cobbles were already hot. At the gate, *i* was stopped by the groundskeeper standing resolutely in the archway. Where was *i* off to? *i* had an urgent appointment at the Hotel de Ville. My pass? *i* was about to throw the newspaper at the fellow's head and dash out, but *i* checked myself: expelled, *i* wouldn't be able lead the students onto the streets, into the revolution. *i* turned back seething with anger. By now the corridor was swarming with speculation. The unrest caused by the newspaper continued in class. *i* tried to persuade the moderates to boycott the afternoon lessons, to protest at the ordinances, but they wouldn't be drawn in. It was almost the end of the school year, they replied. The examinations weren't far off. Had *i* forgotten the country was in the grip of an economic recession? Competition for teaching positions was fierce: those with the highest grades stood the best chance. This was no time for petty self-interests, *i* admonished the student next to me. Sacrifices had to be made. He took no notice: he was too busy scribbling the solution to a projectile motion problem, before the teacher swept the blackboard for the next problem. Cowards! The lot of them! *i* imagined myself in the front lines, a pistol in one hand, the tricolour in the other, leading a group of students. From the solution of the quadratic equation that determined a projectile's maximum range, *i* suddenly saw the need for a new mathematics. One that would arise from the furnace of revolution, not the tranquillity of academic retreats. A mathematics conceived on the streets, amidst the turmoil of humanity, from the chaos of groups clashing, being destroyed, forming new groups. A mathematics grasped in the roar of a cannon as it projected its lethal sphere, or in the flash of a bayonet as it found its mark, or in the warmth of one's blood oozing from a wound. What new geometries awaited the fearless mind? What new arithmetics was to be found in chaos? Perhaps division by zero made legitimate. What new algebras lay behind the phenomena of warring groups? What symbols more magical than x ? *i* remained in the empty classroom after the bell. After erasing the solution to a problem on a falling body, *i* wrote across my clean shadow in large capitals: LONG LIVE THE REPUBLIC.

About fifty students gathered in the stifling dining room which was made even more oppressive by the smell from the kitchen. All the windows were open, but there was not a breath to stir the curtains. Red-faced, the chef appeared at the back door, appraised the gathering with a few slow nods, and quickly disappeared as Guigniault and six teachers entered the room. The teachers sat on chairs arranged in a semicircle, while Guigniault stood at the front, the toes of his shoes just over the edge of the platform. He was about sixty, short, slow moving, with bags under his eyes and a nose like a strawberry. He had a habit of deftly licking his lips with the tip of his tongue. Rumour had it he was fond of brandy, and that its taste was always on his lips. He wouldn't keep us long, he began, smoothing back the few remaining strands of hair. Our teachers had informed him that today's lessons were marred by inattention, in some cases by outright disobedience. He paused, wiped his palms with a white

handkerchief, and arrested a murmur by raising his voice. The ordinances shouldn't concern us: their rightness or wrongness would be determined by others. As long as we were students at this school, he insisted we keep our politics to ourselves. It was reported that someone had written a slogan on the blackboard. That sort of thing would not be tolerated! Anyone who disrupted classes, who engaged in writing slogans, who attempted to coerce others toward politics would be dealt with most severely. For our protection and to avoid disruption to the school, he had decided to keep the front gates closed until further notice. Permission to leave would be granted only in cases of extreme urgency. Faces turned to each other, feet shuffled, knuckles cracked. Were we students or prisoners, *i* called out. Springing from their chairs, the teachers gathered around Guigniault. Students, in his care, he replied. Before *i* could say another word, he turned and walked out, followed by the teachers.

In the dormitory students stood at the windows, straining to see through the still night, staring in the direction of the Tuilleries, the Palais Royal, the Louvre, the Hotel de Ville - the places where the revolution was likely to start. But, instead of the shot that would spark the city from sleep, all they heard in the stifling silence was the odd moth thumping blindly against a window-pane, or a clap ending a mosquito's search for blood. *i* was with Chevalier, Benard and Flaugergues at a window overlooking the courtyard, the silhouettes of cypresses, rooftops, church steeples. A dog barked, rattled a heavy chain.

- They say Guigniault's against the ordinances, said Chevalier.

- He's a Jesuit sympathiser! *i* replied.

- The flag came down well before sunset, Benard added.

- And did he hoist the tricolour in its place? No! The cunning old fox is keeping his options open: if the revolution succeeds he'll say he took down the Royal flag as an act of protest; if it fails, he'll say he took it down to protect it from being burnt.

- Your cynicism surprises me, Evariste, said Chevalier.

- It's not cynicism, *i* replied. It's the subtlety of a mind which once felt at home in mathematics.

i woke with a start. A bird twittered hesitantly. The louvred shutters had been left open and the dormitory was now grey with dawn. It had been well after two when *i* lay down, and then fully dressed, down to my shoes, just in case fighting broke out during the night. Speculation about happenings in the city centre grew during the morning. The radicals interpreted the silence as the calm before the storm; the royalists, as a sign that the Liberal deputies had been intimidated by the King's decisive actions. At midday, the sun more fierce than yesterday, my group hurried to the cypresses along the back wall of the school. The shade was thick, the air scented with jasmine. Appearing from the dining room's side door, the chef looked around, and hobbled toward us, keeping close to the wall. It was hell in that kitchen, he said, and wiped his face with a moist red cloth. Those Polytechnic students were a real sight! Strutting about, tapping their canes, waving their hats, shouting Long live the Charter. Envy and rage welled up in me: *i* wanted to be out there with them, leading a group, stirring the people to revolt. The chef looked around, then quickly pulled out a copy of *The Temps* from under his apron.

- Not a word where you got it, understand?

Returning along the Rue Richelieu, he had noticed a gathering outside the offices of *The Temps*. There was also a detachment of mounted troops, sent to confiscate the presses for defiance of the ordinances. One had to be there to appreciate how the editor, monsieur Baude, handled the situation. The chef swore, it had sent a shiver down his spine. The editor stood on the step of the printing-house, opened a copy of the *Code*, read aloud the law relating to robbery, trespassing and housebreaking, then dared the troops to push him aside. The crowd

roared their support. The troops looked at each other, not knowing what to do. The chef couldn't stay to see the outcome, but editor's bravery had been enough for him. The King had a real fight on his hands this time. Papers were rustling about like autumn leaves all over the city, in the poor suburbs and the rich, in reading rooms and ale houses, in cafes and canteens, in fashionable restaurants and at the fish market. Journalists with piles under their arms were rushing from factory to workshop, giving away free copies. The flame had been lit. Stoked by the newspapers it would turn into a inferno.

Pulse pounding in my ears, *i* turned to the courtyard and looked for a way out: the front gates were closed, the groundskeeper was sitting in the archway, mending a pair of boots, his arm shoulder-deep in leather.

- I'd better get back, said the chef apprehensively.

He would be going out again this afternoon. We should meet again at seven and he would tell us the latest. He left, looking over his shoulder, limping through the shade. We had to stir the students, *i* urged the others. The Director was a coward. He didn't want a revolt. He would open the gates if we got the numbers on our side. We would miss the revolution if we didn't get out.

Despite my efforts during the day - my impassioned arguments in the name of liberty, my assurance that the revolution was imminent, the evidence of *The Temps* - by evening we still didn't have the numbers to challenge the Director's authority. Sunset blazed over the city as we stole away to our meeting. More cautious than this morning, the chef slinked between cypresses and wall, his limp more pronounced. He leaned on a tree-trunk and, gasping for air, slapped the red cloth on the fleshy folds around the back of his neck.

- Please, not so close, boys, he huffed. Let me catch my breath.

The heat! It was unbearable! And his leg was killing him. He hadn't done so much walking since the Russian campaign. The march hadn't been bad on the way up, but the retreat! And him dragging his slashed leg! What a nightmare! He tucked the apron's hem into the waist string and pulled up his left trouser-leg. A Cossack's sabre! He raised his emaciated lower leg: a crimson ribbon of courage was sewn onto his shin. Impatient with his prattle, *i* asked for news from outside. He darted me a sidelong glance. The pain was worth it, he smiled at the others. He would have given his leg for what he had seen out there today. Twenty years he had been dragging this leg around. Twenty years he had felt the scar and questioned his faith. Twenty years of pain, except for the hundred days when Napoleon returned and restored his faith. But Napoleon had been betrayed, not least of all by the scoundrel Marmont, who was now in command of the troops in Paris! And with Waterloo, more disappointment, pain, nights of staring at his scar. But he swore that what he had seen today would make up for everything.

- Is it a revolution? *i* interjected.

The people had been out in force protesting against the ordinances, he continued, giving me a sharp glance. Ragged street-children sang 'Long live the Charter'. The police guarding the Palais Royal were pelted with stones. The first barricade had gone up near the Theatre Francais, and this was followed by two more across the Rue St. Honore. He saw elegant ladies leaning over balconies, waving to confused young recruits, imploring them not to hurt the people. And then, he witnessed a sight that brought tears to his eyes - eyes that hadn't flinched at the Cossack's sabre, eyes that remained dry after peeling a mountain of onions. A young worker, a carpenter by the look of him, ran out on the Quai de l'Ecole waving the tricolour. The crowd along the river-walls was stunned. Everyone stood there, speechless, tears in their eyes, while the young fellow had run past, flag fluttering, the sole of his left shoe flapping at each step.

- The revolution's not far off, said Benard, beaming.
- It's started, *i* exclaimed. And here we are, still talking, no better than those Liberal deputies!

- What can we do? asked Flaugergues, pointing to the gates.

- Charras wants you to...

i grabbed the chef by his hairy forearm. How did he know Charras? Who was he, he asked, alarmed, pulling away. A student of the Polytechnic, replied Flaugergues. He had been expelled six months ago for singing the Marseillaise. Where had he see him, *i* demanded. On his way back to school he was stopped by three youths in civilian clothes who said they were students of the Polytechnic. Before he knew it they had taken him to the Rue des Fosses-du-Temple. A small apartment was packed with students scrambling out of their uniforms and into civilian clothes. A young man pushed through and introduced himself as Charras. What a character! Born leader if ever he had seen one, and he had seen Napoleon. Charras had looked him straight in the eyes and told him to pass on his best wishes to the leaders at the Preparatory. The students must be incited to revolt, Charras had said. The Polytechnic students had already boycotted their classes, and representatives had gone to Laffitte, Perier, and Lafayette, declaring their readiness to support them not just in words but in deeds. Glancing right and left from his cover behind the tree trunk, he reached under his apron and took out a parcel wrapped in newspaper and tied with red, blue and white ribbons.

- More newspapers! exclaimed Benard, snatching it.

- Don't think so, said the chef. Charras told me to guard it well. Said you'd know what to do with it.

Benard tore away the wrapping - it was the tricolour.

- A blessed day, remarked the chef.

Removing his cap stained with sweat, he bowed and kissed the flag. One by one, we lay our hands on it and closed our eyes. Last, clutching a section of red, *i* vowed to escape from this prison, to be as active in the revolution as Charras, to avenge father's death.

{We infer, calling $\pi(a)$ and ψ the periods of $\pi(x, a)$ and ψx
relative to the same variation of x , $\pi(a) = \sum \psi x \phi a$.}

Leave me alone, biographer! Strange, now that *i* don't want you, your presence in this room is almost palpable. A vulture spiralling on a dying creature, you're hovering above my head, keen to pick my thoughts before it's too late. My life! It's not worth writing about! Go and find another subject, someone whose life might serve as an example to young people. You won't leave, will you? Death is in the air - and that's what you biographers live on. Well, have my life, use it for fact or fiction. *i* don't care. My soul's in these papers - that's the only thing worth preserving, and it's probably beyond your grasp anyway. Soul. *i* say the word aloud - the single long syllable makes the flame quiver, fills the dark corners of the room. My soul has absolutely nothing to do with mother's dreadful Christianity, where souls are either delivered or damned. *i* use the same word because it signifies something after death - an unknown quantity, the x in an equation which has no real solutions. Whatever it is my soul isn't subject to the kind of reincarnation espoused by the Pythagoreans. *i* admire that ancient brotherhood for its asceticism and the manner in which it initiated the worthy into the mysteries of mathematics. *i* admire the beauty of their famous Theorem - always a curse to those students who couldn't grasp the incommensurability of a line with obvious beginning and end. A Theorem which probably has far more validity in the imaginary world after death

than in the physical world where a right-angled triangle is always imperfect by the very reality of the lines that define it. Despite the virtues of the Pythagoreans, *i* can't accept their belief that says the body can be reincarnated into a dog or a fish, while the soul remains invariant under this transformation. *i* suppose Swedenborg's theosophy provides the best approximation to my conception of a soul. A man imbued with the Enlightenment, he was fifty-seven when, in a Pascalian turn-around, he suddenly abandoned mathematics and science, and devoted his remaining twenty-seven years to clarifying the arcana concerning heaven, hell and life after death. He claimed to have conversed with angels for thirteen years, from whom he received his authority. According to him, the first stage after death is neither heaven nor hell, but a preparation for one or the other. In this realm, an entity is supposed to take on a form which expresses the intellectual preoccupations of its human ancestor, and that the entities, or souls, of like-minded humans are attracted to each other. It's this last point that appeals to me and accords with my intuitions about the soul. Perhaps under different circumstances *i* might have read a few things by Swedenborg - as it is, the little *i* know has come from the scientific and literary salons which Chevalier and *i* visited from time to time. Yes, his model of the after-life is appealing - and it is a model, just as Kepler's equations fit a model. What better paradise than to be eternally with like-minded souls - all pure mathematicians!

{Thus the periods of the functions of the third species are
always expressible in terms of the first and second species.}

During the summer lull in the Society's activities, *i* seldom left my room in the boarding house. Without plans and prospects, *i* was often drawn to the pistol - sometimes *i* even cooled my brow on its barrel. Why didn't *i* go through with it? Who knows - a vision of the Republic, the flutter of an *x*, an ember of a daydream. One morning as a coal-carrier groaned and thundered up the stairs, *i* found myself thinking about Chevalier's advice, and soon the flutter of an *x* rekindled the embers *i* had wanted to extinguish. In an instant *i* was on the stairs, blackening my shirt in brushing past the carrier, determined to discover the fate of the memoir *i* had submitted to the Academy more than six months earlier.

It was a hot, still morning in early July. Almost a year since the chaos of the Revolution, the city was back in order. Cobbles picked for the barricades had been replaced. Saplings with bright green leaves had taken the place of trees felled to obstruct troops. New street lamps gleamed in the sun. Shopfronts, windows, signs had all been repaired, and business was brisk. Apart from the odd tricolour hanging limply from a building, there was little to indicate that the revolution had achieved anything. The city was like an ant nest: prodded, people scattered in freedom, only to regroup a short time later, safe in the certainty of their lines. Even the most ardent Republicans had succumbed to the old order. *i* was adamant that a more violent revolution was needed to create a new order. The Republic could only arise from the Monarchy's rubble. Perhaps Blanqui and his anarchists were right.

- Evariste!

An open-topped carriage travelling in the opposite direction stopped beside me.

- Where are you going? asked d'Herbinville.

i recognised the young woman with him at once: she had been on the balcony during the trial of the nineteen. To the Academy, *i* said, without stopping. His smile flashed as he offered to drive me there. The young woman looked away to a bandstand, where a dozen different brass instruments blended to produce a mellow tune. *i* thanked him and crossed the street. The encounter disturbed me. *i* had always considered d'Herbinville an ideal

Republican. *i* had admired his manner, his conviction, his generous spirit, and imagined that, like me, he also lived for the Republic, that he would give his life for it. He should not have been with her - riding happily around Paris as though the Republic had been won. It was unbecoming of a patriot. *i* felt disappointed, as though he had betrayed me. This was no time for frivolity. Now, more than ever, men like him had to set an example, inspire the working classes with high minded actions. The feeling of betrayal grew stronger. *i* had considered him a kindred spirit, someone who scorned pettiness. *i* was mistaken. If he were a Republican brother, he would have instructed the driver to take the woman home, leapt out of the carriage and accompanied me to the Academy, discussing as we went how best to realise the final revolution.

{We can also deduce theorems analogous to the theorem of Legendre: $E'F'' - E''F' = \frac{1}{2} \pi \sqrt{-1}$.}

What *i* have written isn't right. How did *i* make such an obvious error? Legendre's theorem should be: $FE' + EF' - FF' = \frac{1}{2} \pi$. Leave it. It's only an example, and not important to the development of my idea. The correction will be made by some careful editor.

{The reduction of functions of the third species to definite integrals, which is the most beautiful discovery of M. Jacobi, is not practicable, except in the cases of elliptic functions.}

Two hundred Republicans had gathered in the restaurant Vendages de Bourgogne to celebrate the acquittal of nineteen officers charged over the incident at the Louvre. Late afternoon sunlight filled the long room overlooking the garden. The flower-beds were full of colour, birds twittered excitedly, the willow's limbs were covered in a fine green gown. Aroused by a week of warm spring weather, by the band playing lively Republican melodies, by bottles of wine chinking back and forth, the gathering was high-spirited, the conversation lively. Probing a chicken-breast with my knife, *i* sat at a back table with a group of students. *i* hadn't said more than a few words since arriving. Despite the brighter days, my thoughts during the past month had been gloomy, due partly to the silence of the Academy, partly to the trial, which had made me feel insignificant. Months had passed since *i* had written to the Academy about my memoir. Nothing. *i* had my pride - *i* wouldn't grovel. They could all go to hell, including Poisson. As there were no other churches to be destroyed, *i* directed my anger inwards - sometimes neglecting my appearance, other times going without lunch or dinner.

A month before, on the seventh of April, *i* was at the Palaise de Justice. A vast crowd from all walks of life greeted the nineteen as they were escorted into the courtroom. Standing on tiptoe, *i* caught a glimpse of d'Herbinville: his clean-shaven face shone in the morning light, and there was an exalted look about him as he acknowledged well wishers. At that moment, *i* more than admired him: *i* was infatuated with him, and envious at the same time. *i* wanted to be there with him, walking bravely into the courtroom, cheered by the crowd. *i* would have had this sort of attention in the mathematical world, if it weren't for small-minded academics - instead, here *i* was, a nobody in the crowd. But a name could be made quickly in politics: one brave act, and *i* would be in the public eye. People would point me out as a Republican, just as they were now admiring d'Herbinville.

i had watched the proceedings from the back of the balcony. Cavaignac, Trelat, Guinard, Pointis - they all spoke with conviction, expressing compassion for the poor, the

sick and the suffering. The gallery acknowledged their speeches with wild applause, while the president, monsieur Hardoin, hammered vigorously to restore order. When d'Herbinville took the stand, *i* pushed through to the front and stood beside a young woman, who accorded me a sharp glance from under prominently arched golden brows. A small gold disc inscribed with an S gleamed from her ear as she turned to her female companion. Her perfume was pleasant, after the smell of those at the back who had come straight from the abattoirs.

- Isn't he handsome? she whispered to her companion.

d'Herbinville stood upright, gripping the surrounding bannister, meeting the president's look with haughtiness verging on contempt. How had he come by those weapons, asked Hardoin, pointing to a table with a collection of carbines, pistols, packets of cartridges. Straightening to his full height, d'Herbinville stated some had been obtained during the three glorious days last July, when he and his comrades had disarmed several posts for the sake of the people. Cheers erupted, the gavel clattered, the young woman applauded - her gloved hands were like butterflies.

- He risked his life for the people, she said.

And as she leaned forward over the balcony railing, as though straining to catch d'Herbinville's attention, *i* noticed the hollow in the nape of her neck. Speaking with barely concealed defiance, d'Herbinville had wanted it known that some weapons were bought at his own expense. He had the good fortune to succeed in business, and had used his income to equip young men who couldn't meet the expenses needed to serve in the Artillery.

- Handsome, brave and generous, said the young woman's companion.

- Did you distribute arms?

- Yes, your Honour.

The reply discharged a burst of commotion. As d'Herbinville was led from the stand, the young woman dropped her embroidered handkerchief which fell in his path. He picked it up and nodded. *i* wasn't sure whether the nod was intended for me or her. He sat down with the other eighteen and their numerous advocates. The gallery applauded him, and *i* vowed to do something as brave - an act to show everyone *i* was a Republican.

i attended the trial for weeks, and each day my outlook darkened. When the jury acquitted them, *i* watched with growing envy as they were surrounded by thousands first in front of the Palaise de Justice, then at the Quai aux Fleurs. *i* followed, rancour eating at me, as d'Herbinville and Trelat leapt into a carriage, only to have the horses unharnessed by the adoring crowd and the carriage pulled to Trelat's door.

Shredding the chicken-breast, *i* looked up at the main table: d'Herbinville was sipping wine, talking jovially, reaping attention with his flashing smile. This gathering wasn't becoming of Republicans: an expensive restaurant, while people were living in dark hovels; fancy food, while others couldn't provide bread for their children; wine, while water for drinking was polluted. What was *i* doing here? *i* didn't need wine to stir me to action, or its fumes to evoke visions of a Republic. It was for those who lacked passion.

When the waiters cleared the plates, the nineteen were congratulated and toasts were made, followed by speeches in honour of previous revolutions. They drank to Robespierre. To Respail, who had recently refused to accept the cross of the Legion of Honour because it offended his Republican ideals. Then Alexandre Dumas was called to make a speech. The writer, who had been scribbling in a notebook during the festivities, stood and delivered an apology for the role of writers in revolutionary times. About thirty, well-groomed, he spoke confidently, pausing now and then to examine his left palm, as though it held the text of his speech. The magnanimity of writers! *i* had heard it all before. He praised the nineteen, while thinking himself superior to them. But where was Dumas during the revolution? Were his

hands blackened by gunpowder? He had probably wrapped himself in a smoking jacket and looked down from the height of his writer's retreat, making notes on the death and destruction, which would serve as material for his next work of fiction. Did he want something more for his next novel? A dramatic episode?

- Long live Dumas! A toast to Dumas!

After the toast he sat and began a conversation with a man on his left - one of the King's comedians! Parasite! *i* clutched the poignard concealed under my jacket. He was consorting with the King's clown! Exploited the suffering of illiterate people, to provide the bourgeois with amusement and diversion. Exploited those who gave their blood, to satisfy his craving for wealth and fame. Very well! *i* would give him something to write about. A toast, *i* proposed, springing up. The student next me echoed my proposal. The clamour continued. *i* raised the poignard together with the glass of wine *i* hadn't touched.

- To Louis Philippe!

After their initial bewilderment, those at my table urged me to sit down, the student next to him tugged my jacket. *i* climbed onto my chair and repeated the toast several times. There were looks of surprise, concern, alarm. A few tried to silence me with whistles and howls. *i* was mad! It was a threat! *i* would jeopardise the Society!

- To Louise-Philippe! *i* shouted, stepping on the table.

The poignard gleamed in the lamplight. The room filled with commotion. Blanqui and his group clapped and cheered. Dumas and his party protested, then pushed their way through the room, knocking over glasses and bottles. Dumas darted me a reproving look and led his party through the open glass doors, into the garden. Go, *i* yelled. Coward! The Republic didn't need writers of fiction. But if he must write for the bourgeois, he should depict this evening as it was. Write that *i* had been drunk on ideals, not wine. Describe me as one of the most passionate of Republicans, prepared to give my life for my beliefs. Be truthful, Dumas, *i* shouted. He shouldn't tell his gullible readers that he had left the restaurant because the King's clown drawn him away. Everyone present knew why he was leaving: he didn't want to be compromised by my remarks.

The celebration degenerated to wild whistling, applause, remonstrations. Stepping from the table, *i* was surrounded by a group of younger Republicans who, all slightly drunk, were now shouting the words of my threatening toast. *i* led them out into the mild, fragrant night. We were still chanting 'To Louis-Philippe' as we marched to the square of Vendome, where we continued bellowing the chorus for some time. A few of the more intoxicated began laughing, dancing and clowning around the central column. Tired of the drunken group, *i* sat on steps of the column, dispirited by their behaviour: laughter and wine would never realise our highest ideals.

{The multiplication of integral functions by a whole number is
always possible, as is the addition,}

In the Preparatory's dining room members of my group had distributed themselves among the tables, intent on winning students over to our cause. But as the end of supper-time approached it was obvious we didn't have the numbers needed to force the Director to open the gates. Sneering, the Royalists told us to use our heads, pointing to the relative calm outside as proof of the King's strong position. The majority of students were against the ordinances, but they were afraid of a revolution and argued for legal resistance. Chevalier, the only Saint-Simonist at the school, advocated dialogue on the grounds that violence was against scientific principles. Restraint was needed he whispered, as a few Royalists at our

table chuckled provocatively. Enough talk, *i* snapped. The Revolution needed...*i* had become boring, someone shouted from a back table. Aimed at his head, my fork struck the wall. *i* was mad, yelled another, leaping to his feet. *i* turned to attack him, but Chevalier and Benard ushered me out.

The night was hot, heavy with the smell of smoke. Here and there musket shots were muffled by the pall stifling the city. Horses and carriages rumbled. Light from a three-quarter moon sheened the courtyard, glinted on the spikes along the top of the wall.

- I say we hoist the tricolour, said Benard.
- Save it for the streets, replied Flaugergues.
- There'll be no revolution tonight, added Chevalier.

We were under a wall-lamp guarded by two gaping griffins. *i* leapt down the stairs and ran to the front gate. The large padlock was still warm from the sun. *i* hammered it against a metal plate. A door in the entrance swung open and the groundskeeper's shadow flew onto the curved wall. A shot cracked in the distance. Who was there, he grumbled. Rattling the padlock, *i* insisted he open the gate.

- You again!
- For the Republic's sake - open the gate!

Raising both arms and leaning on the low lintel (*i* recall thinking his armpits were like nests), he ordered me back to the dormitory, son. They were fighting for his sake, *i* pleaded, walking into his shadow. They needed help. The Revolution was ready to explode. Revolution, he grunted, spitting the word into the dark. He had seen one in my lifetime: that was enough. *i* should take his advice and not be deceived by the smooth-talking professional classes. They didn't really care about the working-class. They stirred up things for their own advantage. He had fallen for their lies once. Never again. If a revolution were to break out, *i* wouldn't find those professionals on the streets or at the barricades. Never! It was working-class blood that would stain the stones - *i* could be sure of that. Those cunning rogues stoked the fire with their hot breath, while the poor workers...He snorted and spat into a patch of light. *i* ought to look after my own skin and stay away from politics. The Director had given him orders not to open the gates for anyone, and that was how it would be. The door's shadow swooped on me. *i* paced the yard like a caged beast until forced inside by an insistent bell.

In the dormitory the janitor extinguished the lamps and, on instructions from Guigniault, locked the door. Students left their beds and gathered at the windows. The sky was clearer than the night before: constellations crowded upon the city, bright above cypresses the moon silvered anxious faces. A succession of shots crackled. *i* leaned into the window's alcove for a better look. Silence. A fire was raging on a crossroad. Not too far away a few sleepy street lamps were suddenly blacked out. They were breaking the lamps, remarked Chevalier. What demons would be let loose on Paris tonight? The dormitory became quieter, the sporadic shooting outside stopped, most of the students went to bed. Chevalier and *i* were still at the window, in the light of the moon now almost at its zenith. Did *i* know, he mused, if we gazed up at the night-sky more often we would be more brotherly toward each other. The fixed order up there was a sobering sight. That was what men should strive for, that was what cities and societies should be based on. Newton and Kepler explained the universe in terms of equations, and through equations predicted the positions of planets and stars. Their equations had dealt a deadly blow to the Christian idea of God. Not Napoleon, Laplace was his hero: he had banished God from his Celestial Mechanics and sought to grasp, not Europe, but the universe by means of equations. The age of the priest, poet, politician was over: the new millennium will be the age of the

mathematician. The word had failed: verse, religion, legislation had not improved the human condition.. It was now time for number to rule the world. *i* shouldn't be seduced by what was happening out there, he said, starlight twinkling in his dark eyes. *i* could become a great mathematician. My work on equations would do more to improve people's lives than a hundred revolutions. My theories might eventually have applications in physics and medicine. This was no time for dreams, *i* said, twisting the window's latch. Laplace's ordered universe had started to break apart. Reality was out there on the streets, not up there. Where was the mathematician who would plunge into chaos and pluck out the new equations? Equations that would create the Republic. *i* couldn't sit back at a time like this. *i* had to throw myself into the chaos. If *i* survived then *i* might be the founder of a new mathematics; if not, at least *i* would have been true to father's memory and given my life in the name of freedom.

- Come on, Evariste. Let's go to bed. Your revolution won't start tonight.

Sleep? At a time like this? *i* remained at the window alone. The fire on the crossroad had collapsed to a heap of winking embers, the shadows that flitted around it had disappeared. Three leaden tolls struck. Not a shot since one. Twisting the latch, *i* opened the window, climbed into the alcove, and leaned over the sill. A faint breeze whispered in the cypresses. *i* looked for a way down: nothing, not even a drainpipe. If the shooting had continued, *i* would have tied sheets and blankets and risked a drop of three or four metres. Chevalier had been right, at least for the time being. It was the calm before the storm. The night smelled of gunpowder. Tomorrow, Paris would explode. *i* settled into the alcove, arms wrapped around my legs, chin on my knees. As my heart throbbed against my thin thighs, *i* watched, listened, strained for a sign, a sound, the spark that would explode the oppressive night.

Shots! A volley of them! *i* sprang from sleep. It was already daybreak. More shots from various quarters. *i* climbed onto the sill for a better view. Thick ropes of smoke twisted straight up. Horses were clopping in all directions. Revolution! The janitor opened the door and bawled that we were to assemble in the courtyard at 5.30 for an address by Guigniault. He rushed to my bed.

- Where is he? he asked, sweeping aside the blankets. Stop! Don't do it!

All the students were now up, staring at me on the edge of the sill. *i* seized the moment. Cowards, *i* shouted. Couldn't they hear the shooting? The Revolution had begun. People were already dying for their sake. Our brothers on the streets needed us. We had to force the Director to open the gates. The janitor approached the window stealthily, like a cat stalking a sparrow. That was far enough, *i* threatened, stepping back, my heels off the sill.

- Evariste! pleaded Chevalier.

- Don't do it, boy, said the janitor.

They were all nothing but cowards. If my words couldn't stir them to oppose tyranny, perhaps my death would. Holding the top of the window-frame, *i* leaned slightly backwards. Some of the students winced, others looked away. The janitor reached out.

- Don't! Chevalier cried.

i warned the janitor not to get any closer. If *i* couldn't die on the streets fighting for the Republic, *i* would die in an act of protest against the Director, who kept us here like common criminals. Get on with it, someone called. Jump or stop posturing. *i* was keeping them from breakfast. Posturing! The act back-fired: instead of inciting the students with theatrics, the word posturing angered me, and the situation became deadly serious. *i* had something to prove to those *i* despised. It was now a question of honour. *i* had been challenged. Long live the Republic, *i* shouted. As *i* turned to the courtyard, the janitor pounced, caught me by the waist, and lifted me from the alcove. He threw me on the bed and berated me until he gasped

for breath. *i* thanked him and assured him *i* wouldn't try it again.

Washing ourselves at a trough in the latrines, Chevalier asked in a whisper whether *i* had really intended to jump. The water cooled my burning face and ears. *i* had gambled on the janitor catching me, *i* replied. And if he hadn't? *i* shivered as a few drops trickled down the back of my neck. The revolution would've had its first martyr.

The bags under Guigniault's eyes were fuller than usual as he waited for us to assemble. The janitor stood beside him on the steps to the dining room, whispering in his ear. Outside the unrest was escalating: shots sounded from all parts of the city, carriages rattled past at a gallop, wagons rumbled heavily, children sang 'Long live the Charter' to the tune of a nursery rhyme, men sidetracked from work shouted 'Liberty', stressing the syllables in time with their marching boots.

- Today's the day, *i* said to Benard, feeling a hot flush turn to a chill.

Could we hear the commotion outside, began Guigniault, licking his lips. That was why he had decided to lock the gates. He loved liberty as much as anyone, but there were times when liberty had to be contained for the sake of the future. He had been a teacher for almost forty years, and he knew well the passions, the ideals, the spontaneity of youth, but he also knew there were people who didn't think twice about exploiting youth's exuberance. He asked us to bear the measures he had imposed until Saturday, another three days, by which time he was certain a political solution would be found to the unfortunate business out there. In the meantime, he wanted our word of honour that we wouldn't attempt to escape, that we would desist from an activity that might endanger other students and the school. The students looked at each other, some nodding, others uncertain, a few scowling. A shot rang against the school wall. He was lying, *i* whispered to those around me. Was there anyone who couldn't give their word of honour? A crow swooped over the assembly, splotted the cobbles, and flew to the tip of a cypress tree, whose top section was touched by the rising sun. *i* raised my hand.

- Thank you for your honesty, monsieur Galois.

And would he be honest with us and declare himself. Was he for the Charter or against it? He buried both hands in his pockets and bounced on his toes. His chief concern was to preserve the independence of our fine school. As some of us knew, he could have retired last August, and led a quiet life, with time to read the many books he had to put aside because of his duties. Yet he didn't. Why? Because he didn't want the school to become a pawn in a political game. Education, the nurturing of character and intelligence, must remain independent of politics and religion. The last year hadn't been easy. He had resisted the Church in its push to exert more influence in schools. But he had also stood against the socialists, who would do away with a balanced curriculum. And now, he had to steer the school through all that out there. He was determined to go neither left nor right, but to follow the middle way: the road of reason, the golden mean. And if some of us saw him as sitting on the fence, if we accused him of being weak and indecisive, if we denounced him as an opportunist, he would endure that for the school's sake. Applause fluttered from a group of students. The janitor, who had been trying to remove something from his left eye, looked around sheepishly and also clapped. Raising his arms, hands brightened by the sun just peering over the rooftops, Guigniault thanked us and implored us for restraint until Saturday.

- Monsieur Guigniault, *i* called.

Benard attempted to pull me away.

- You've said enough for one day, hissed a student.

- You're becoming boring, sneered another.

- What is it, monsieur Galois? he asked, licking a smile.

i insisted that he open the gates. There were those among us who were compelled by conscience to help the people. We couldn't accept imprisonment when our brothers at the Polytechnic were fighting for freedom. His conscience was just as compelling, he said, flicking open a silver fob-watch. His duty was to protect his students from danger and death. *i* pulled away from Benard's hold. When the Revolution had been won, *i* said, and history recorded how the Law students, the Medical students, the students of the Polytechnic had fought bravely for liberty, he would have to account for the absence of students from the Preparatory. This school will be without honour in the Republic. A test of will, we stared at each other for a moment, neither flinching, until he brushed back the light gleaming on his scalp, turned abruptly, and entered the dining room.

By midday the outbreak had grown to what sounded like a revolt. Too agitated to concentrate on school work, *i* was alone in the yard, pacing in the cypress shade, desperate to get out. Stoked by the fierce sun, cicadas raged. Flushes and chills went through me. The padlock rattled. The groundskeeper opened the squealing gate. *i* hid behind a tree trunk. A boxed cart full of firewood entered the archway. This was my chance. The cart rumbled across the yard on its way to the kitchen. The driver's eyes were covered by a broad-brimmed hat. Flies buzzed around a gash on the horse's twitching flank. The axles were clogged with golden grease. *i* waited, squatting behind the trunk, my body trembling now with a flush of excitement, now with a chill of misgivings. When the cart returned, *i* ran behind it and climbed inside. Was he all done, asked the groundskeeper. The driver drawled that barricades were up all over the place and he didn't know how he would get home. The archway was cool. *i* lay flat, cheek pricked by bits of bark, heart beating against the boards. The groundskeeper wished him luck and rattled the lock. The horse plodded a few steps. Stop! The janitor's voice. He leaned over the sideboard, face beaming. *i* stood and brushed the dust from my clothes. A chill trickled down my back, weakened my legs. Suddenly *i* was in an executioner's cart, on the way to the guillotine. *i* was too tired to be afraid, and even when the blade appeared, dripping with sunlight, *i* climbed the steps calmly, admiring its clean trapezoidal shape.

{by means of an equation of degree n whose roots are the values to substitute in the integral to obtain the reduced term.}

The bolt rammed into my skull. The metal plate sliding over the opening in the door guillotined my nerves. Two days of solitary confinement! Alone, between the flame honed to a point and a bucket stinking in the corner. Two days of solitary confinement! *i* had to subdue a rising anxiety, or else *i* would go mad in this windowless cell. The violent outburst in the canteen a week earlier had sapped my vitality, left me feeling vulnerable. My cough rattled in the cell. *i* was run down. If *i* had more strength, *i* wouldn't have lost my patience with the superintendent. But the prison was humming with ideas of how best to celebrate the first anniversary of the July revolution: ideas ranging from open revolt, to a silent vigil around a catafalque to be placed in the courtyard. For days there had been mutterings, grumblings, forebodings. Then, yesterday at lock-up time, as *i* was talking with a few others in the cell, a shot cracked the evening, and the prisoner nearest the window slumped to the floor. We fell to our hands and knees. *i* noticed a figure with a musket dart from the window across the street. The prisoner wasn't badly hurt: a grazed forehead. We took him to the superintendent, who listened with increasing dismay as he examined the prisoner's injury. The assassin should be arrested at once, *i* said. Assassin? The shot had come from the guards' quarters. Nonsense! It had been intended for me. So, that was my game, flared the superintendent. The

anniversary! *i* had contrived the whole thing to ignite a riot. After all, the bullet hadn't struck the prisoner - he had conveniently gashed his head in falling.

- You're behind it all! *i* shouted.

Lying on the bunk, *i* attempted to calm myself the only way *i* knew: mathematics. A shiver passed through me. *i* blew out the flame. Archimedes had needed sand for his work, *i* needed nothing but a blackboard of darkness. Perhaps the purest mathematics could only be done in a cell like this. Mathematics: the new monasticism. Just as ascetic monks withdrew to a cave and lived frugally for the sake of union with God, so mathematicians should retreat to cells, mortify the body through fasting, cleanse the mind with silence, and through this attain union with the new God: the holy spirit of mathematics.

October shook summer from the poplars outside the walls of Sainte-Pelagie. Duchatelet and *i* were finally tried on charges of wearing a banned uniform and illegally carrying arms. The authorities had played their cards well this time: the trial, by judge alone, was over quickly and we were both found guilty. He was sentenced to three months, *i* received six - on top of what we had already served. The sentence crushed me. *i* lacked strength for anger, or even to raise a protest at the fact that my sentence was twice Duchatelet's. *i* didn't care as my defence counsel, paid for once again by d'Herbinville, vowed, crimson with outrage, that he would appeal against the severity of the sentence, and that justice would prevail.

My health deteriorated, my appearance became haggard, *i* became more withdrawn. The prisoners who had taunted me now looked at me with pity. My only comfort was mathematics: *i* spent hours pacing the courtyard, ignoring the knife-edged wind, the dry leaves dancing around me, the misty rain. But even in this, my moods vacillated: at times my enthusiasm shot up, and everything was possible; other times, my spirits plummeted, and everything was meaningless. In moments of optimism, *i* felt there was still time to develop my ideas, put them in a book, make a name as a mathematician. Driven by such hopes, *i* revised two papers on pure analysis (one of these was the memoir Poisson had rejected: it was finally returned to me in prison) and wrote a preface to an eventual book, putting in ink most of what *i* had said in my first lecture in the bookshop.

Nathalie had visited me shortly before the appeal. She was alarmed by my appearance and the state of my health. What had become of me, she asked, her eyes brimming with tears. *i* scratched the table-top with longish fingernails. Why had she bothered to come? A hoarse cough convulsed me, crumpled me like paper. Did *i* need anything? Food? Blankets? Money? No. And in that hollow sound *i* heard an echo of father's voice. Mother was worried about me, she said. She was free to visit, *i* replied. And for an instant *i* was alarmed by how thin my wrists had become. *i* had hurt her, she said, raising her voice. She was still waiting for an apology. The old animosity rose for an instant, but quickly sank in a swamp of apathy. She should tell her...But another violent cough shook me. She reached out as *i* struggled to smother it with my hands. Had *i* seen a doctor? It was the dampness in here, that's all. *i* would be home for Christmas, she said, forcing a smile, and then we should try to be a family again.

The appeal was rejected. Devastated, *i* accepted it without complaint, too weak to protest. Winter tightened its grip on the prison and on my lungs: my cough was now chronic. The others in my cell complained. *i* avoided them as much as possible, choosing to pace the courtyard, wrapped in a long overcoat given to me by Chevalier. *i* was now numb to the monotony, the privations, the cold. This was the only way to survive until my release at the end of April. But what then? Return home? Never. Seven months, and she hadn't made an effort to visit me. *i* had my pride, too. The Society? Continue the struggle for a Republic? Such a fight needed passion. Not so long ago *i* would have given my life for the very idea of

a Republic - that passion was now all but dead. Would freedom revive it? Perhaps not. *i* had heard the Society was becoming increasingly divided, and there was a real danger it would fragment, perhaps cease to exist, before my release. And mathematics? Perhaps that required even more strength and passion than the Republic. My mind was a blank. Even Chevalier's encouragement failed to stir me. *i* was destroying myself, he said, on a recent visit. Cavaignac, Respail, d'Herbinville - they didn't care about my mathematical talent, or else they would have kept me from this place. The Society was doomed. *i* should join the Saint-Simonists on my release. They would provide a clean, quiet room where *i* could continue my work. Scratching the table with a dirty fingernail, *i* hardly said a word. Rain was falling obliquely across the barred window. A steeple was just visible through the black branches on the other side of the prison wall. At the end of the visit *i* was surprised by a diagonal cross scratched on the table.

{The multiplication of integral functions by a whole number is always possible, as is the addition, by means of an equation of degree n whose roots are the values to substitute in the integral to obtain the reduced term.}

What did *i* have in mind when writing this? Now, no more than an hour after scribbling it, the ink barely dry, and *i* am unable to see its significance. The sentence is obscure, even to me. The inadequacy of words! Even at the best of times they give only an approximation of what lies in the mind. If only *i* had more time. *i* could have grasped the flash of intuition that produced these words and expressed it more clearly. As it is, it will remain nothing more than an obscurity, until discoveries in this direction are made by others, then in thirty or forty years people will say: yes, he had foreseen this before the ground work had even been done.

{The equation which gives the division of the periods in p equal parts is of degree $p^{2n} - 1$.}

It was now quieter outside. Someone coughed hoarsely in the courtyard. Dishes were being washed in the sanatorium's kitchen. *i* slapped at a mosquito which had been annoying me for some time. There was a small spot of blood on my palm: that was the price the mosquito payed for proximity to flesh. Anxiety began to gnaw at me again. But it wasn't from fear - how could *i* fear a world *i* loathed? A world corrupt to the core? No, it was anxiety for these papers. Concern for my soul - the part of me that hadn't been corrupted by the world. Now, staring at this spot of blood on my palm, *i* suddenly realised that the Republic *i* had sought existed only in mathematics. Chevalier, dear Chevalier. *i* should have listened to him. He was the only friend *i* ever had - he and father. What should *i* do? What time was it? *i* didn't care about my body - let the bullet come. But these papers, my soul - how could *i* save it from the ditch?

{Its group contains in all $(p^{2n} - 1)(p^{2n} - p)\dots(p^{2n} - p^{2n-1})$ permutations.}

We were on the east side of the Louvre, in a procession filing past the common burial place of thirty people who had been killed in the revolution. *i* dropped a coin in a large copper bowl for the widows and orphans of those who had given their lives for the Republic.

Would *i* join the Saint-Simonists, asked Chevalier? They were too accommodating, their ideas too vague. *i* wanted to belong to a society with more fire in it, one that would accept my anger and avenge father's death. And my mathematics? It could wait. Had *i* heard about Cauchy?

- Has he lost someone else's memoir?
- He left Paris last week. Joined the Royal family in exile.
- Like a dog at its master's heels.

Cauchy! *i* spat out his name. Coward! Self-serving egoist! Where was the justice in this world? Why was talent, maybe genius, granted to someone like him? He didn't have a trace of generosity in him. Hedonist! He wouldn't sacrifice his breakfast, let alone his life, for the ideals of mathematics. He should be ashamed when uttering the names of Pythagoras, Archimedes, Abel. Hypocrite! And yet this egoist would probably add more to mathematics than the unfortunate Abel. Exile wouldn't stop his stream of memoirs: he would no doubt become even more prolific. In the meantime *i* would have to put aside my important researches in order to fight for freedom. Two prostitutes smiled in strolling past. A few months earlier they had been driven from the streets and public places by a Royal decree, now, in the wake of the Revolution, they were out in greater number than before.

- Liberty has its price, Chevalier commented.

Cauchy was no better than them, *i* said, holding my breath against their perfume. What did Saint-Simon have to say about the likes of them? Prostitution, drunkenness, poverty: they would all be eradicated when mathematicians governed the state. The people weren't interested in the square root of negative one, *i* said. Had he forgotten what the chef had told us: crowds followed fresh-faced students last July, just because they were in uniform and prepared to lead the way in the face of cannons.

As Paris put on its make-up after the orgy of destruction (cosmetics couldn't conceal the smell of death stifling the air, even though the mass graves had been cobbled over and strewn with flowers and wreaths), *i* attended meetings of various political groups and societies, weighing one against the other, trying to decide which to join. One afternoon, on an oath of secrecy, *i* was taken to a gathering of anarchists at the back of a bakery. Despite the heat from the oven, the speaker wore a black frock-coat buttoned to the neck. He was about twenty five, thin and pale, with lips like a fish. He spoke in a lifeless voice, hands in pockets, not raising an eyebrow while advocating destruction and social chaos as the preconditions for a new order. And he concluded in a confidential tone.

- Our first target must be Louis Philippe.

Darting furtive glances at the twenty or so young men with surly looks, *i* realised this group wasn't for me and left as the speaker asked for questions, eyes glinting with suspicion. Yes, *i* also hated Louis Philippe intensely, *i* would welcome his assassination, but not in the manner of those anarchists. Something about them filled me with revulsion. They were motivated by a perverse passion for destruction, not by the ideals of a Republic. Malcontents! That's what they were! They had turned to anarchy because they were either failed artists or megalomaniacs who, realising they couldn't be Napoleons, were driven to destroy by a feeling of spite and resentment.

On another occasion *i* had arrived late at a gathering of followers of Joseph Fourier. The speaker, a young man with a sparse reddish beard, was answering questions as *i* entered. What was the essence of Fourier's Utopia, someone called from the front. The beehive: its order, proportion, harmony. Could he elaborate on Fourier's idea of the phalange? The present cult of the individual was a capitalist phenomenon, propagated to feed machines and benefit a few. In Fourier's system, each phalange would be situated on 500 acres,

accommodating 2000 people, where each person would contribute according to his or her talents and abilities. For instance, it was a universal fact that children enjoyed playing in filth, so they would be given the task of cleaning the abattoirs and sewers. What place did mathematics have in their system, asked another. Science was the door to a better future for mankind, and mathematics was the key to that door. Their system was based on accurate graphs, logical proofs and axioms, detailed tables and calculations. Joseph Fourier had found the solution to the problem of social organisation and harmony.

i was angered by the use of the word mathematics in such a setting. What did they know about mathematics! It had nothing to do with politics and society: it was a pure study, pursued in solitude, with no material goals. He had used the word to sound authoritative, to impress his listeners, to give Fourier's system respectability.

Was it true Fourier had studied the feasibility of harnessing ships to whales, lisped a fellow, causing a flurry of laughter. And turning sea-water into lemonade, heckled another. And bricks to bread, burst a third. They were metaphors, shouted the speaker, flushed with indignation. And what about his views on sexuality, shouted a fellow next to me. He had heard that nothing was forbidden on the phalange: young girls who misbehaved would be given to elderly phalanx members, and all perversions would be catered for. Was it to be like that? Bourgeois conditioning, the speaker strained against laughter and derisive taunts. Once again monsieur Fourier had been using metaphors to advocate a break with capitalist morality. In fact, he was simply espousing complete freedom: spiritual, intellectual, physical.

A few days later *i* went to the enormous hall of Pellier's riding school, where a crowd had gathered in oppressive conditions to hear speakers of the newly formed Society of the Friends of the People. It had quickly established itself as the largest of the Republican societies, attracting many of those who had fought in the streets. Francois Raspail spoke softly, without rhetoric. A doctor in his mid-thirties, he advocated social reform, a moderate approach toward the Monarchy, and proposed that each member of the Society become guardian and patron of a number of poor families. His speech was greeted coolly, with an occasional hiss of disapproval.

- What's your background, friend? asked a youth wearing the Polytechnic uniform.

Suddenly the heat was unbearable, and the air was thick with the smell of sweat and horse manure. Weren't the students of the Preparatory locked in during the three glorious days? The question stung me. *i* turned away from him, but wherever *i* looked eyes darted glances at me, questioning my presence amongst people who fought for freedom. *i* had climbed over the wall, *i* said, summoning enough courage to meet his stare. Had *i* received a decoration, he asked. Without waiting for a reply he pulled up his sleeve: there was a scar along his forearm, still with fragments of crusty scab. A Swiss sword on the Rue Saint-Denis.

The next speaker stepped confidently onto the platform and subdued the crowd by raising his arms. Godefroy Cavaignac was about thirty, lean, tall, with a thick moustache and long hair. He kissed the tricolour and began by calling for a more radical constitution, one that would pave the way for a Republic. *i* joined the wild applause. *i* felt a sense of belonging, as *i* had at father's funeral. This wasn't a nest of anarchists, who scurried about like rats in the dark and met in secret - there were two thousand people in the hall. *i* drew strength from the size of the gathering. The Society would make itself heard, draw even more followers, grow and become a force for change.

{The equation which gives the division of a sum of n terms in p equal parts is of degree p^{2n} . It is solvable by radicals.}

At the Academy's office, a man with padded elbows was stirring a white solution and grimacing painfully. As *i* explained the reason for my visit, he added another teaspoon of sugar or salt and rotated the spoon so that it clinked the glass.

- An abscess, he winced.

Had monsieur Poisson presented my memoir to the Academy? How did it look, he asked, ignoring my question. He twisted his neck, tilted his head, and stretched open his mouth with a hooked forefinger. The back of his lower gum was ulcerated white. It had been like that for a week, he mumbled. He drank a mouthful of the solution, swished it with puffed cheeks, and spat it in a bucket under the desk. Salt, he said, reaching for the glass. *i* prevented him from taking another mouthful by asking for my memoir in a sharp tone. Pressing his cheek, he went to a grid of shelves at the back of the room, saying he was only the assistant, not the Secretary. After shuffling papers in several partitions, he pulled out what looked like a memoir, disturbing a moth which fluttered from his face and fell into the bucket. Galois, Evariste, he announced, garbling my name. My memoir had been examined by monsieurs Poisson and Lecroix, who had presented their report to the Academy on the fourth of July - just over a week ago. What was their opinion, *i* asked, shaking with excitement. He shot a glance at me. *i* wasn't sure whether he was smiling wryly or grimacing in pain. The moth rippled frantically in the bucket. Could *i* read their comments? *i* was annoyed at the way he embraced my memoir. He explained that protocol in these matters required a copy of the report to be made, the copy filed, and the report sent to the author. As a copy hadn't been made, and as he wasn't the Secretary, he didn't have the authority to show original reports to anyone, including the author. *i* had to see it! He stepped around the desk and glanced into the bucket, where his reflection was fragmented by the moth's death throes. Protocol, monsieur. Was he being officious? A game of charades to distract himself from his discomfort. Tucking the memoir under his arm, he reached for the salt solution.

- My memoir, *i* said, pulling out a knife.

Startled, he placed it on the desk and backed away. There was a moment's stillness as *i* read the report, even the moth stopped struggling. Lowering the knife, *i* dropped the memoir on his desk and left without a word. On the street *i* was almost struck by a passing carriage. If only my memoir had vanished like the others, *i* wouldn't have been hit so hard. *i* saw the report again, the signatures of Poisson and Lacroix, their comments: unintelligible, incomprehensible, vague, further expansion and clarification necessary, doubtful results. *i* could accept these cutting judgements, attribute them to the shortsightedness of the referees. After all, my terse manner of exposition required a certain kind of mind, a certain kind of reading. Poisson and Lacroix were both plodders, unable to follow my ideas because they were burdened with all the excess baggage of present mathematical exposition. What really devastated me, what *i* couldn't come to terms with, was Poisson's accusation of plagiarism. He had even quoted passages from Abel's work and pointed out similarities in our methods. Plagiarism! *i* hadn't heard of Abel when *i* submitted my first researches to the Academy, and the present memoir was simply an elaboration of those initial findings. Besides, Poisson's quote from Abel was from a letter the Norwegian wrote to Crelle and Legendre concerning discoveries he had made shortly before his death, some of which dealt with the theory of equations. Yes, *i* had read the letter, though not in *Crelle's Journal*, where it had been first published a year ago, but in *Ferussac's Bulletin*, which published them after *i* had submitted my memoir. Poisson was a fool! He knew nothing of the spirit of mathematics - a spirit that imbued both Abel and *i*, and moved us to investigate similar problems.

{Concerning the Transformations. First, by reasoning

analogous to that which Abel indicated in his last memoir, we can show that if, in a given relation amongst integrals, we have the two functions $\int \phi(x, X)dx, \int \psi(y, Y)dy, \}$

Alone in the dormitory, *i* stood at the window all afternoon, waiting for our meeting with the chef, straining to make sense of the calamitous events shaking the city. A fever had gripped me: flames wrapped me one moment, a chill shook me the next. My strength was giving way, and at one point *i* thought sleep would overcome me. But *i* fought against it, determined not to succumb, even to a short nap - the revolution wouldn't find me sleeping! When we gathered eagerly around him again, the chef took a sheet of paper from his apron and shuffled it proudly. There was too much happening out there, so he had made a few notes to help his memory. He was no scholar, but he figured that if he didn't write down what he had seen soon after seeing it, he might forget it, or tell it differently from how it had really been.

- Paper and ink, my old man used to say, they keep men honest and...
- Is it a revolution?

Scowling at me, he took out a red cap, smoothed out a few creases, and puts it on. His manner irritated me: he may have been good Republican, but his air of self-importance, his conceit in being the sole authority on events outside, had become more noticeable with each meeting. This was no time for charades: facts had to be told plainly, honestly. He read from his sheet. Setting out at sunrise, he had made his way to the centre of Paris, together with a sea of others. Groups were gathering at the Porte St. Martin and the Porte St. Denis. A wagon load of paving stones had been used to barricade the entrance to the Faubourg St. Denis. Printers were collecting in the Passage Dauphine, where a book warehouse had been turned into an arsenal. He was swept up by a crowd which stormed into the Theatre du Vaudeville. Two large wicker baskets full of costumes were taken from the change rooms. Scrambling for arms and imperial uniforms, people dressed and climbed onto the stage for the greatest drama of our time. In the Rue de la Montagne-Sainte-Genevieve the crowd greeted a group of students with: Long live the Polytechnic. The students replied: Long live Liberty. One of them raised his hat, ripped out the white cockade, stamped on it, and shouted: Down with the King. People pulled the royal arms from the court's workshops and smashed them to pieces, or threw them into bonfires. Street lamps that survived the night were smashed and oil spilled onto the pavements. When he asked a fellow why he had smashed a lamp, the fellow replied that he wanted to grease his boots, to march proudly into battle. Troops appeared at the Place de Greve and opened fire with cannons. The tocsin sounded from the church of St. Severin and was answered by a thundering toll from Notre Dame. Trees from the boulevards were axed and used as barricades to prevent the passage of troops, cannons, cavalry. As the fighting intensified in the midday heat, doors opened to shelter the insurgents, while the poor soldiers roasted. Women of the people took pity on the parched troops: they stopped making lint and gunpowder for the insurgents, in order to bring wine and water to bewildered recruits. By mid-afternoon the insurrection was raging in all quarters of the city, and everywhere the people had the upper hand over troops unsuited to warfare in narrow lanes, against snipers, confronted by barricades. A Swiss detachment marched to help the troops stationed at the Hotel de Ville. The sight of those hated red uniforms aroused even greater fury from the people, and they poured from every street and alley into the Place de Greve. A barricade was quickly set up. Furniture flew out of windows, books fluttered and fell like dead birds as entire cases were thrown onto the pile, a church was ransacked and the pews

torn out. The Swiss pressed on, and at one stage it seemed they might get the better of things. But a young man, no older than us, ran out waving a tricolour on the end of a lance, shouting that he would show everyone how to die. He charged at the Swiss and was shot a lance's length from the enemy. His self-sacrifice incensed the people. The barricade stood firm against the Swiss, while a flood of humanity poured in from the rear, routing the Swiss after a furious engagement.

Wiping saliva sticking to the corners of his mouth, the chef paused just long enough to judge the reception of his narrative. A knot tightened in my stomach. *i* should have been out there. The revolution would be over at that level of engagement. *i* was envious of the young man with the lance. How could his poor words and that scrap of paper convey what he had seen, he continued. How could he describe the scene at St. Pelagie prison, where the debtors smashed the gates and joined the guards to prevent hardened criminals from escaping and exploiting the turmoil? How could he convey the bravery of a workman who calmly approached a captain of a company entering the Place de la Bourse and struck him on the head with an iron bar? How could he express the magnanimity of the captain who, blood oozing over his face, used his sword to knock down a soldier who was about to shoot the workman?

- What more can I tell you, boys? To do justice to all I saw today I'd need to be Hugo or Delacroix, but I'm just a chef with a scrap of paper.

Face flushed, tinged crimson by the sunset, he wiped his glistening forehead and told us to meet him again tomorrow. His limp more prominent than yesterday, he now walked boldly across the courtyard. At the bare flagpole he stopped, looked up, adjusted his red cap, and continued to the kitchen. A shiver passed through me. My shirt was moist with perspiration. *i* had to get out. A cannon thundered in the distance. Tonight was my last chance. *i* wanted to fight in the revolution, contribute to the Republic, become blood-brothers with the young man with the lance. Tomorrow everything would be over: the battle won, the dead carted away, the cobbles washed clean.

- The flag's under my mattress, said Benard. We'll hoist it after supper.

i left them, not knowing where *i* was going, walking simply to subdue my anxiety, to make this confinement more bearable. In the crimson clouds over the city *i* saw the fallen youth with the lance. A moment later my father arose from the body of the youth. Smiling, he beckoned me with tenderness and love, just as he had done when *i* was a child. A fire burned in me. *i* needed to belong, to be loved again, to give myself without reservation to someone or something. Father had provided that need, but he was dead. Mathematics had given me meaning, but *i* doubted that *i* would ever have the peace of mind to work again. The Polytechnic was to be my spiritual home, but *i* had been refused entry. Now there was only the chaos out there. That was where *i* belonged. *i* wanted to throw myself into it, experience chaos, be overwhelmed by it, forget that *i* was Evariste Galois. *i* wanted to be energy, pure thought: energy to subdue the chaos, thought to impose a new order on it, to realise the Republic. That was where *i* would find my home, where *i* would be reunited with father, and finally work again.

The supper-bell sounded, and *i* was still pacing under the cypresses. Dusk was falling, cicadas screeched, the scent of jasmine mingled with gunpowder. The knot in my stomach tightened again. A cannon hadn't thundered in an hour, the crackle of shot was subsiding. Were the people winning or losing the revolution? This was my last chance! *i* grabbed the jasmine bush spilling over the wall, twisted it into a thick strand, and tugged - it gave way, showering me in white stars. A few shots sound from the direction of the Hotel de Ville. *i* tried again, this time *i* twisted a thicker strand.

- What are you doing? asked Benard.
- Getting out.
- Calm down, Evariste. You're drenched.

Tears stinging my eyes, *i* gripped him by both shoulders and pleaded for his help to climb over. My words crumbled into incoherent sobs. He became alarmed, perhaps feared *i* might do something desperate. Bigger and stronger than me, he squatted, put his head between my legs and straightened up. Clutching the jasmine, *i* stood on his shoulders and reached up for the wall's overhanging ledge. Pushed up by the soles of my shoes, *i* just managed to grip the spikes along the top of the wall. Smothered by jasmine, *i* scrambled to raise myself onto the ledge.

- Who's there!

Benard bolted at the groundskeeper's voice. Hanging from the spikes, *i* thrashed against the hand pulling me by the ankle. No sooner did he shout for help than footsteps came running, and *i* was caught by the other ankle. *i* kicked and screamed against those pulling me down. My grip broke, and *i* fell into a tangle of arms.

- You again! hissed the janitor.

Gasping, *i* twisted, kicked, screamed as their grip tightened. Suddenly a lamp on the ground went black, my strength gave way and *i* dissolved in hot, damp darkness.

{the last integral having $2n$ periods, it will be permissible to suppose that y and Y can be expressed by means of a single equation of degree n in terms of x and X .}

The room became suddenly oppressive. *i* sprang up from the papers on the table. Anxiety was getting the better of me. *i* had to do something. A bell was tolling the hour - had it struck nine or ten times? What was happening to me? Without realising, *i* had somehow worked myself up into a state verging on panic. Where was the composure *i* had only an hour ago? What was this anxiety twisting my insides? Pacing the room in my socks, *i* felt the nail-heads in the floorboards, saw my uniformed reflection flitting past in the mirror, and all the time my thoughts were fluttering around the papers, like that moth battering around the lamp. What should *i* do with them? Burn them? Destroy the only decent thing to come out of my miserable life? No. *i* had to find a way out of this dead end. Refuse to take part in the duel? Leave without a word? But where would *i* go? The bitter disappointment of the last few weeks would haunt me wherever *i* went. No, there was no escaping the duel. But there was something yet to be done before they came. *i* went back to the table, to my papers. The smell of burning oil was becoming stronger. How much longer would the flame last? Time was slipping away.

{Then we may suppose that the transformations are constantly made for two integrals only, since one has evidently, in taking any rational function whatever of y and Y ,
 $\int \phi(x, X)dx, \int \psi(y, Y)dy, \}$ + an algebraic and logarithmic quantity.}

i could barely open my eyes against the sunlight. The janitor was sitting on the edge of my bed, blowing on a spoonful of pumpkin-soup. *i* recalled the entire dream, in minute detail, the instant *i* regained consciousness. It was broad daylight, the school courtyard was

blinding. There was not a shadow in sight - not the cypresses', nor the flagpole's, nor my own. At the foot of the flagpole there was a phial of ink and two large white quills. *i* began writing on the smooth cobbles, scratching an equation that proved difficult to solve. The equation was simple though. Why couldn't *i* solve it? The more *i* concentrated, the more meaningless my writing became. *i* was soon caught in a maze of my own making. Suddenly, *i* panicked at the thought that my life depended on the solution. Time was running out. *i* poured the ink onto the cobbles. As a shadow spread around my feet *i* became less anxious. A quill in each hand, *i* started flapping my arms, and in an instant *i* was hovering above the flagpole, drifting over the cypresses, the spikes gleaming in the light. And then *i* was on a steeple, standing on the arms of a cross, fearfully embracing the top section, my cheek against a scab of rust. A crow swooped out of the blue and perched on top of the cross. *i* shivered at the sound of its claws scratching the metal. What was *i* doing up here? *i* belonged down there, on the tumultuous street. Father waved to me from a barricade of felled trees. The way down was deadly. There was no foothold, nothing to grip, only a louvred window half-way down the steeple. No sooner did *i* think of sliding down to it, than *i* was in free fall, spiralling into darkness, bracing myself for impact. But *i* found myself in the midst of a crowd rushing through the foyer of a theatre. It was only after climbing onto the stage, breaking a footlight's reflective mirror, that *i* realised *i* was completely naked. As people shouted and quarrelled over costumes flying through the air, *i* didn't know where to hide, until *i* snatched a pair of breeches and a red coat with gold epaulettes. On the street again, *i* was followed by a boisterous group which had been waiting for somebody in uniform. *i* led them to a barricade made of books. Finding a slim volume on equations, *i* raised it like a flag and scrambled to the top, from where *i* was able to see the advancing troops. But the barricade began to give way, and *i* was sinking in books. The more *i* struggled, the faster *i* sank, and in an instant *i* was up to my neck. Mouldy paper pressed against my mouth. *i* was suffocating in books.

- Get this into you, said the janitor.

i was in the infirmary. The Revolution? *i* wanted to speak, but *i* was too weak. *i* made a feeble attempt to sit up, but the janitor pushed me back with one hand. My head sank into the pillow, into darkness. *i* awoke and in the twinkle of Chevalier's dark eyes *i* saw another dream. *i* was on the street with students from the Polytechnic, wearing their uniform and cap. They were marching resolutely, singing the Marseillaise to the sound of drummers and fiddlers. And it occurred to me that, like music, mathematics was also capable of ordering the surrounding chaos. *i* glanced at a street sign: Rue de Babylone. Mother stood in a doorway, but *i* marched past her without a word. We over-ran a post, forced the soldiers out, and distributed the arms amongst the followers. The commotion was becoming more frenzied. *i* was now in front of the Louvre. A small barefooted boy climbed nimbly up the spout and hoisted the tricolour. The locks were broken and the crowd poured into the corridors. *i* was swept into a long room with busts of ancient philosophers. Pushed from their pedestals, marble heads cracked and crumbled. Hands black from gunpowder, a fellow raised Euclid and waited for the moment to shatter him. The parallel lines of the tiled floor converged to a point beneath a window open to the sun. Dropping my musket, *i* ran and saved Euclid. The head was cold, and it became heavier as *i* struggled with it through the devastation. Should *i* leave it and follow the crowd to the Tuilleries, where a corpse was to be placed on the King's throne? The students urged me on, but *i* couldn't move my hands. In the confusion somebody whispered my name, and a warm breath caressed my face.

- Evariste.

Chevalier was leaning over me with a gentle look. Twilight filled the room, stained the walls, tinged my friend's hair. He whispered that he had brought me something to eat. *i*

listened intently: birds were twittering - nothing else. My hands were numb.

- What day is it? *i* asked.

My mouth and lips were dry. Thursday. And the Revolution? He propped me up and arranged the pillow behind me. The Revolution, *i* repeated, opening and closing my hands tingling with pins and needles. The troops had fled. Paris belonged to the people. Benard had raised the tricolour and nobody had dared to take it down. We had won, *i* said. The future was ours. Guigniault would pay for closing the gates.

{There are in this equation obvious reductions in the case where the integrals of the two numbers do not have the same number of periods.}

When *i* returned to my room from the Academy, my dejection had contracted to anger. No more hopes, *i* vowed, standing before the Artillery uniform hanging from a nail on the wall. Never again would they deceive me. Poisson and Lacroix! Their very names intimated collusion with the Jesuits! *i* took out one of a pair of pistols d'Herbinville had given me. No more mathematics, no more false hopes. At the window, *i* cocked the hammer and aimed at a broad-hipped woman plodding across the square with a bucket of water in each hand. *i* squeezed the trigger: the hammer struck, sharp as a cracking knuckle. The woman stopped beneath the window and complained to another.

- Stinks worse each day!

- Make sure you boil it.

- We'll all be poisoned if they don't clean it up.

After pacing the room for some time, *i* stopped before the uniform. In the jacket's silver buttons *i* saw the same thing: the distorted room, a small figure, the pistol pointing at an enlarged head. If a corpse were needed to start the final revolution... Father appeared, beckoning me with arms outspread, a silver star on his chest - the one grandfather received from Napoleon. And then mother slipped into all the buttons, embracing the Bible. The hammer cracked.

A week later, secure in my uniform, *i* was at the window, counting a bell clanging against the grey morning. *i* hadn't slept much: the night had been humid, the mosquitoes persistent, my dreams unsettling. The day's activities had been well planned. Duchatelet and *i* would lead a group of fifty disbanded Artillerymen to the Greve, where a ceremony would be conducted in honour of Bastille Day. d'Herbinville had supported me against some of the more conservative members, who argued that wearing the uniform was illegal. The Society had become too cautious, *i* countered, cheered by some students. Action was needed to ignite people's emotions. A man with a gold chain across his vest jumped up and said that the Society's survival depended on caution, otherwise it would be banned, driven underground, lose the support of the people. Eyes flashing, d'Herbinville pointed out that the Society ran the risk of making speeches and nothing else, and that it would lose the people's confidence if it didn't act from time to time. His fiery call for action dispelled my misgivings about him. Perhaps the woman in the carriage had been nothing more than an acquaintance, perhaps she meant nothing to him, and that his real passion was the Republic. The admiration *i* had felt for him returned. For an instant, as our eyes met in mutual understanding, *i* was moved by a feeling of fraternal love.

At the sixth clang *i* was alarmed by several policemen marching across the square, heading for the courtyard of the boarding house. Taking two pistols, a poignard and a short-barrelled musket, *i* ran up a flight of stairs to the roof, and crouched beside a sooty chimney.

- That's his room, sir.

i recognised the caretaker's lisp. A fist thumped the door.

- Evariste Galois. This is the commissioner of police for the district of Saint-Victor.

- What's he done? asked the caretaker.

- We're here for your welfare, monsieur Galois. We know about today's demonstration. You'll be detained until tomorrow, then released. I give you my word.

As they scrambled through my room, *i* pressed the musket's cold barrel against my forehead, hardly breathing. Two blue-grey pigeons swooped down not far from me and performed a courtship dance. The candle wax was still warm, someone remarked. He must have left before dawn, said the caretaker. Voices and footsteps receded down the stairs. *i* got up and scattered the pigeons just as they coupled in a flurry of feathers.

{Thus we have only to compare those integrals both of which
have the same number of periods.}

Division by zero: the great taboo in arithmetic. Forbidden because it undermines $1+1=2$. And yet using the taboo, *i* can prove that $1 = 2$, or $1 = \text{anything}$. What is *i* divided by zero? Multiplication by zero reduces everything to zero. And death? Is it multiplication or division by zero? From a graphical point of view, division by zero represents a singular point: a paradox - an instant when a function is both positive and negative infinity. Perhaps death is a singular point in an otherwise continuous function of being. And when that small round sphere finds its mark tomorrow? My being might well be divided by zero. At one and the same instant my being will plummet toward negative infinity and soar toward positive infinity. Is that what the moment of death is? A point where consciousness becomes transcendent, where the mind expands to reconcile contradictions, where being overcomes space and time?

{We shall prove that the smallest degree of irrationality of two
like integrals cannot be greater for one than for the other.}

Now a member of the Friends of the People, *i* never missed an opportunity to berate the students who had held back during the revolution, calling on them to redeem their honour by supporting the Society and speaking out against the new monarchy and the Director. The tricolour now raised daily in the school courtyard wouldn't save Guigniault - he had no place at the school, and *i* would expose him and have him removed. But many students were still mistrustful of my austere manner, fearful of my fanaticism. Some even joked and laughed in my face. But they couldn't discourage me - *i* now drew my strength and confidence from the Society. Guigniault was my target: if *i* exposed him for the coward he was, *i* would earn the respect of all the students.

- You've found your place, said Chevalier.

People were milling about in the gardens of the Palais-Royal, hoping to catch a glimpse of Louis-Philippe and his family. The glow of the Three Glorious Days had receded: the weather had turned cold, and the city had wrapped itself in its grimy overcoat. Leaves scurried about like street urchins.

- The Society's going from strength to strength.

- And your studies?

- Freedom and Equality are more important.

Equality, he said cynically. Did *i* really believe in that? We were all different, with

different abilities. Was that old woman selling matches my equal? Equality! Mathematics was the only place for equality. There was no natural equality between people. Human progress lay in encouraging and rewarding those with creative intelligence. That was precisely where Saint-Simon had shown his understanding of human nature. He proposed that a subscription be established before Isaac Newton's tomb, and that everybody was to donate according to their means. Each contributor was to name three mathematicians, physicians, chemists, physiologists, writers, painters, musicians. The donations would be divided amongst those who received the highest vote, and the twenty highest vote-earners would constitute the Council of Newton, with a mathematician as president. This Council would form a spiritual government, whose duty would be to direct all nations toward a common goal.

- Still trying to convert me, Auguste?

Was that the reason for his friendship? *i* wasn't naive anymore - father's death had opened my eyes. The Saint-Simonists were living in a world of fantasy. The antics of Bazard and Enfantin were nothing more than self-indulgence veiled in the smoky incense of a new religion. Where had they been when people were dying on the streets? In their hazy temple, wearing fezzes and gowns, preaching sexual freedom to dreamy disciples.

- Self-sacrifice, Auguste, not sensual gratification! That's how the human spirit will progress.

His dark eyebrows fell. We walked in silence through a group of children who sprinkled us with star-shaped leaves. A patrol of the National Guard marched past on its civic duties around the city. They were also entrusted with protecting Louis-Philippe, who needed all the protection he could get. There were anarchists and fanatical Republicans whose sole reason for existence was to kill him. Some were probably in the gardens right now, waiting for his daily appearance - a ruse to endear himself to the people, to fool the gullible that he was in fact the Citizen-King.

- My friendship's genuine, he said, snapping a twig. We'd better end things here and now if you think otherwise.

i embraced him and apologised. Ah, Auguste, my dear friend, *i* said, perhaps with a little too much effusion. If ever *i* returned to mathematics he would be the first to know. Sometimes, though, *i* doubted it very much. Strange things were churning inside me - hatred, anger, destructive urges. My heart was ruling my head, and *i* didn't have the strength to reverse the situation.

{We shall show subsequently that one may always transform a given integral into another in which one period of the first is divided by the prime number p , and the other $2n - 1$ remain the same.}

Weakened by fever, *i* used father's study to avoid the others. *i* was working on a new theorem, *i* told them, and *i* had to shut myself away until *i* had proved it. It wasn't all pretence though: on returning home for the summer vacation, *i* tried to subdue my inner turmoil by reworking the manuscript *i* had sent Cauchy - the one that was never submitted for the prize - but *i* wasn't able to concentrate and couldn't fire my thoughts to the intensity that had produced those ideas. Sometimes *i* brooded for hours behind father's desk, feeling his presence in the contours of the chair, the armrests worn by his elbows, the impression made by his head. The pains of the revolution hadn't given birth to a Republic. The fighting subsided on the Thursday, the school-gates were opened on Saturday. Still shaking with

fever, *i* had gone out and witnessed the destruction, the suffering endured by the working classes. What did they get for the blood they shed? Betrayal! Their victory had been usurped by the so-called Liberal politicians and journalists. They were the ones who had stoked the revolution, and now they were afraid of a Republic - afraid it would take their properties, positions, wealth. Instead of placing their faith in the future and the Republic, those cowards had turned to the past. Instead of smashing the throne, those self-serving parasites had begged Louis Phillipe to take the place of Charles. A King for a King! Bourbons, Orleanists - they were both the same! A constitutional monarchy instead of a Republic! The whole thing reeked of betrayal. Collusion between royalty and religion!

A cloud swallowed the sun as *i* set out for the cemetery - to pay my respects to father before returning to school. Thunder rumbled in the distance. The hillside cemetery was surrounded by a stone wall which father, as mayor, had repaired not long before his death. A thorny bush bright with red berries grew over the wall near the entrance. *i* collected a handful and ate the sweet fruit as *i* rustled through knee-high grass bristling with golden barbs. At the grave, *i* leaned on the granite headstone and passed a finger over the chiselled name and dates. And what of the vow *i* had made to father? To become a mathematician, change the world through mathematics, bring honour to the Galois name? Thunder grumbled closer, the sky became darker. Change the world through mathematics! How naive! Father had been right: the word was more powerful than the number. Revolutions were stoked by words not numbers. Lawyers and journalists had inflamed the people to revolt. *i* felt a small cross chiselled into the granite. Betrayal! The people had been betrayed by the very politicians they trusted, father had been betrayed by mother. Lightning flashed, like the veins in a clenched fist. Thunder rolled. A breeze scurried through the dry grass. A cuckoo counted nearby. *i* hadn't contribute to the revolution, *i* said aloud, placing my palm on the headstone. But *i* promised, father that *i* would fight for the Republic. No more words and symbols - actions.

Large drops splattered the granite slab. *i* rustled out of the cemetery, spiked grass-heads clinging to my trousers. Too agitated to face the household, *i* went the cottage in the almond grove. Shooting through the leaves, warm drops struck my face as *i* filled my pocket with almonds. Lightning twitched, thunder shook the ground. Inside, *i* cracked the shells with a stone as rain fell heavily, vertically. The solution of the quintic? Would *i* ever again experience that feeling of elation? And my work on a general theory of equations? *i* was certain of its importance: it was a new, powerful tool for probing the core of any equation. Unlike the quintic, there was no mistake this time. My theory was revolutionary. Why hadn't anybody else, even the astute Cauchy, seen its significance? They were all small-minded conservatives!

A figure darted across the window. The door flew open and a woman appeared. Her black matted hair dripped on the doorstep, her floral dress wet against her body. She carried a basket full of small flowers. Her glistening forearms were tattooed with strange symbols - the gypsy from the town square! *i* leapt up, clutching the stone.

- I thought it was empty, she said.

Her bare feet squeezed water from her sandals as she stepped inside. She had been gathering herbs when the storm broke, she said apologetically. Bowing her head, she tossed her long hair over her face, gathered it in a tail and twisted it several times until water trickled on the stone floor. She then wound it in a bun and skewered it with a wicker from the basket.

- That's better, she smiled.

A drop trembles on the crimson tip of each ear. The stories students whispered in the dark flashed through my mind. A fine, steamy vapour rose from her dress. *i* tried to concentrate on the symbols on her arms. Was *i* from town? A student, she beamed, brushing

her eyebrows. Must be a fine life in Paris, all those beautiful women. Boulders tumbled over the cottage. Rain fell like lead shot on the roof. We might be here for some time, she winked, adjusting her dress. Did *i* have a sweetheart in Paris? Her breasts shook as she laughed. She took an almond from a few that *i* had shelled, split it in two with her front teeth, and offered me half. *i* had never believed those stories students told in the dark, dismissed them as fantasies, wishful thinking, and yet here *i* was in the midst of one. She asked my name. No sooner did *i* tell her than *i* regretted it. Such a serious look, she said, chewing the almond open-mouthed. Had *i* ever been with a woman? Or was *i* studying to become a priest?

- *i* am a mathematician, *i* said emphatically.

That shouldn't stop me having a sweetheart. Her laughter grew with the thunder. Crossing her arms, she pulled off her steamy blouse. The stone fell from my hand and clattered on the floor. Her sandals squished as she walked around the table. *i* looked away from her nipples surrounded by pimply discs. What was that symbol on her arm? A pair of crescent moons back to back?

{It will only remain therefore to compare integrals which have the same periods,}

How could the Lycee publish Guigniault's blatant lies? He had the audacity to claim he supported the struggle against tyranny! That was exactly what *i* needed to expose him. Shaking with anger, my writing barely legible, *i* had addressed a reply to the editor of the *Schools' Gazette*, in which *i* called Guigniault a coward, and condemned him for threatening students with police at a time when others were dying for liberty, and for his crass opportunism in that he had been quick to decorate his hat with a tricolour brocade when the revolution had been won. The letter was published and signed simply: a student of the Normal School - the Preparatory's new name after the revolution.

It was the recreation hour. A Royalist lackey burst into the library where *i* had gone to escape the icy wind in the courtyard. *i* was in real trouble this time, he sneered. The Director wanted to see me at once. *i* knew at once it concerned my reply in the *Gazette* which had come out that morning. *i* knocked sharply on his door. He was sitting at his desk, head propped on his arms, a copy of the *Gazette* spread before him. The air was scented with the tang of pine. Flames twisted and writhed in the fireplace. Addressing me as young man, he invited me to sit in a chair with faded upholstery checked with crests and crowns. His cordial manner surprised me, took the edge off my anger. Was this a ploy before a furious attack? But there was something about him - fatigue, a kind of resignation. The fleshy sacks under his eyes were heavier than ever, his nose had a purple tinge, and he licked his lips more frequently, as though they were now always dry. Was *i* the author of the article? A log hissed over my yes, sap sizzled. He leaned back in the chair, closed his eyes for a moment, then gazed up at the lamps glowing above the desk. Perhaps he should have retired last year, he said, licking a faint smile. Forty three years - but that was another story. He had spoken to monsieur Richard about me not long ago. It appeared *i* had real talent in mathematics. He sighed and leaned forward again, back hunched, elbows on the *Gazette*. Why was he so wistful? Was it his way of disarming me? A log cracked, as though struck by an axe. Talent? Genius? Why was it given to youth, he mused. It seemed unjust. After all, what had youth done to deserve it? Genius should be the product of hard work, perseverance, experience. It should ripen in old age, as a reward for a lifetime of labour. What sweeter consolation than to taste the fruits of genius in old age, just before the end? A gift for forty three years amongst musty textbooks, monotonous exercises, mute blackboards, mean-spirited students. *i*

remained on my guard - his mawkishness wouldn't get the better of me. This was the man who had denied me a part in the revolution. Like me, he was also in favour of a Republic, he said, picking at a sunspot on the back of his hand. He had been very much against the ordinances and had anguished over the decision to lock the gates. But they were now private matters - nothing to do with his present responsibilities toward the school. The letter of mine had placed him in an extremely difficult position. Once again he was forced to suspend his personal beliefs and act in the best interest of the school. To remain Director and hold the respect of the student body, he had no choice but to expel me. He did this with great reluctance, despite my unkindness in the article. My expulsion would take effect immediately. The School Board would ratify his decision in due course. The log in the fireplace sparked.

{and such consequently, for which n terms of the one can be expressed without any other equation than a single one of degree n , by means of two others, and reciprocally.}

Torment, tantalising, a whole week of it - until *i* was alone with her. We were in the gardens of the Louvre. The bright spring morning marked an easing of the epidemic: the papers had reported fewer deaths, though warning against complacency. A cautious hope showed on peoples's face: from a fellow grinding away on a wheezing organ, to a woman wearing an enormous hat trimmed with feathers and bows. We walked close together, shoulders almost touching, our shadows one, gliding on the sandy path. She was telling me about Hugo's latest play. As she reached out for a black butterfly fluttering across our path, the back of her lace-gloved hand brushed mine. *i* swept a few pine needles from a bench and we sat. A rush of blood hissed in my ears.

- The last month has been the happiest in my life, *i* said, swallowing my words.
- You've recovered well.

This was the opportunity *i* had been waiting for. *i* had to tell her how *i* felt: when *i* was with her *i* felt complete, at peace with myself and the world. But, as so often happened at crucial moments in my life, words betrayed me, refused to flow, became clogged in my throat. And so *i* reached out and took her hand. She pulled away and a hangnail on my thumb caught on her glove. The long arch of her golden eyebrows fell, her full lips sealed to a line. *i* was momentarily confused.

- Stephanie, *i*...
- No, Evariste! You've made a mistake!

A crow swaying on a nearby tree cried a few times and sprang away, causing a shower of white blossom. Ours was a friendship, nothing more, she said, standing. Cocoa! Cocoa! An urn strapped to his chest, a vendor rattled a silver bell. *i* reached for her hand again. If d'Herbinville's friendship meant anything to me, *i* mustn't. d'Herbinville?

- We're getting engaged!

The urn distorted everything. The vendor grinned. The cocoa smelled strongly. He wasn't right for her, *i* said in my confusion. He would never love her as *i* did. He would take her for granted, mistreat her, have affairs with other women. Stop it, she flashed. He was a fine man, generous to a fault. He was paying for my stay at the sanatorium, and *i* dared make such accusations! Not only that, d'Herbinville had asked her to spend time with me in his absence, to entertain me so *i* wouldn't brood.

i paced the courtyard all morning - nothing, not a sign of her, not even in the window. Was it true? Were they about to be engaged? But why hadn't she told me during the course of

the month? Why hadn't she at least intimated it? No! It wasn't pity for an invalid. Her look, her laughter - she felt something for me, and it wasn't pity. There couldn't be anything serious between them - she had hardly mentioned his name. Was she looking for a way to break off with him? He was due back in the next few days. Maybe she was afraid of him. Maybe she didn't want to upset her parents. *i* had to speak to her again before he returned. *i* had to tell her not to be afraid, that *i* would defend her against him or anybody else who dared to intimidate her. Her cat, which had become fond of me from my visits, clawed its way down the trunk of a blossoming plum-tree in the corner of the yard. *i* caressed its warm fur, picked a few flakes of blossom from its back, and gazed into its black slits. As the cat arched and curved its tail, *i* sprang up and marched to the front door. Her mother opened. Stephanie was in bed with a headache. The cat purred in circles around my ankles. *i* ran up to my room and wrote a letter in which *i* poured out my feelings.

- Monsieur Galois! her mother huffed.

- Please, give this to Stephanie.

- But, sir, I...

- *i* won't leave until *i* get a reply.

i sat on the doorstep. Shadows of playful swallows flitted over the courtyard. From a chimney across the street, a thick braid of smoke unwound, loosened, spread against the clear sky. A hearse rattled past the gate, followed by a train of mourners. The front door opened.

- Stephanie mustn't be disturbed, she scowled, handing me the reply.

In my room, *i* couldn't bring myself to open the perfumed envelope at once. A faint hope struggled against an overwhelming misgivings. *i* walked around the table - around her fragrance, around my name written in black ink, around her pale hand with its blue veins, around my fate. Taking a breath, *i* threw myself into the abyss of her neat writing. We could no longer see each other under the circumstances of the previous month... All private correspondence between us had to stop...In future she would try to converse with me in a friendly manner, as she had before this impossible situation...*i* should not think about things which did not exist, and which never could have existed. *i* tore the letter and threw it in the fireplace, amongst the bits of ash and charcoal.

{We know nothing about this.}

i watched from the window as a well-dressed man of about thirty strode across the courtyard and knocked on their door. Her mother greeted him affectionately. He looked familiar, but it wasn't until he stepped out with Stephanie that *i* recognised him as a friend of d'Herbinville's from the Society. They stood on the steps, where he spoke to her in a serious manner, accentuating his words with sharp gestures. She listened with a troubled look and nodded from time to time. He then kissed her on each cheek and left. As she closed the front door, *i* was certain she glanced up at my window. Taking with me her novel *Scarlet and Black*, *i* was determined to see her. If it was nothing but pity she felt for me, *i* wanted her to say it while looking me in the eyes. She opened the door guardedly. *i* passed the book through the narrow opening. She took it without a word. Could *i* see her for a moment? There was nothing more to say. Who was the fellow who had just visited her? Her mother's youngest brother. He had upset her - why? She told me to go. Had he threatened to tell d'Herbinville about us? She didn't want any trouble. My health had improved. *i* should leave the sanatorium before d'Herbinville returned.

- *i* have to know, Stephanie.

- Know what?

The abyss opened before me again.

- Was it all out of pity?

She tried closing the door, but *i* stopped it with my foot. She shouldn't fear d'Herbinville, *i* said. *i* would protect her. She meant everything to me. If she said the word *i* would sacrifice everything - mathematics, the Republic, my life. She didn't want my life, she flashed, words sparking from her red lips. Yes, it had all been out of pity at first, and then it became a game. She flirted with me, lead me on, just like a naive schoolboy. She had used me to make d'Herbinville jealous when he returned, to test his love for her. There! *i* had the truth.

{You know, my dear Auguste, that these subjects are not the only ones I have explored.}

Yes, *i* had to save my soul, and there wasn't much time left to do it. Chevalier! *i* had to write to him. Summarise my findings. Stress their importance. A last will and testament. He would do the rest. He would help save my immortal soul. *i* dipped the quill in the inkpot - empty! How late was it? The streets were quiet. *i* had to get some ink. Without thinking, *i* went to her place first, knocked on the door. Her mother answered. *i* pleaded for a little ink, told her it was a matter of life or death. But she looked at me in bewilderment, threatened to call the police, closed the door in my face. Phial in hand, *i* ran out of the sanatorium like a madman. If she only knew! *i* swallowed back my tears. *i* was ready to spill my blood for the Republic, and she wouldn't give me a drop of ink!

The shopkeeper was preparing to close. He refused to serve me. It was past ten. He would be fined for trading after hours. *i* appealed to his humanity, my life depended on it. Complaining of varicose veins, he limped to a small barrel at the back and filled the phial. *i* strained over the counter, listening to the liquid's black trickle. He glanced over his shoulder. If only he knew: the ink staining his stubby fingers was my source of my immortality.

Pinned with stars, the night-sky was full of geometrical possibilities. How many Zodiacs were possible by rearranging the lines between stars? Libra could so easily become Scorpio. Countless equally valid horoscopes could be constructed for the same person, among them one foretelling a long and happy life; another, an inescapable early death.

i sidestepped a hawker who tried to entice me into a theatre. Best play in town, he barked. The theatre was clean, not one of their patrons had fallen to the plague. In a darker sidestreet, music and laughter spilled out of a tavern. There was a strong smell of onions frying. *i* hadn't eaten since morning - *i* would never eat again! Never taste an apple again. As *i* broke into a trot, *i* become entangled in a group of youths emerging from a basement tavern. Boisterous, reeking of smoke and wine, they enclosed me in a ring. What was my hurry? *i* shouldn't listen to what the authorities said about the cholera. Excitement - that was the only way to beat it. No use running from it. Wine and women - the only remedy. *i* ought to spit in the plague's ugly face. Live for the moment. If cholera didn't get me, consumption would. If not consumption, the clap. Laughter thick with wine burst from them as they sang and danced around me. What did *i* have in my hand? They stopped in a circle. What was inside? Ink. *i* should forget my studies. Dip my wick instead of my quill. Clap was less painful than cholera. How could they be certain it contained ink, one of them asked. The circle contracted. Might be poison. Who was *i* running from? What had *i* poisoned? It was full of ink, *i* protested And the thought flashed that *i* might be torn to pieces over a phial of ink, in a lane smelling of onions, with that woman looking down peacefully from that third floor window, holding an infant to her breast. Drink it, one of them ordered. Drink it, sang the others,

skipping around me. *i* tried to reason with them, but their laughter turned to threatening snarls. *i* raised the phial and swallowed a mouthful of bitterness. The circle opened and they sent me off with a chorus of exhortations to live for the moment.

{My reflections, for some time, have been directed principally to the application of the theory of ambiguity to transcendental analysis.}

i would have expressed this more fully under different circumstances. As it is *i* have had to use a few words to convey an entirely new field of mathematics. Maybe a little difficulty isn't such a bad thing. It will force those who are interested to read between the words, make them work for my meaning. After all, following a mathematical argument isn't like reading a novel: it requires an active reader, someone prepared to struggle with the text, to enter the labyrinth of another's mind.

{It is desired to see *a priori* in a relation among quantities or transcendental functions,}

Everything was ready: the phial, the quill, the blank sheets. My mind was spinning, sparking thoughts, just as it had done when *i* first discovered mathematics, when *i* threatened Louis Philippe, when *i* met her. Love and death - that was what drove one forward. But how could *i* grasp these flashes, translate them to words? *i* looked at myself in the mirror: my lips were still black, even though *i* had rinsed my mouth several times. It had to be close to eleven. Seven hours to save my soul.

i began a letter, addressing it to all Republicans. *i* chose my words very carefully - nobody must ever suspect *i* went to my death willingly. *i* asked my friends to forgive me for dying in this manner. *i* had wanted to give my life for the Republic, but *i* was the victim of a coquette, and there was no way out. Here, to avert suspicion, to make it appear *i* wanted no part of the duel, *i* added a touch of pathos: Why was *i* destined to die for such a trivial reason? For something so contemptible? And *i* followed this with further proof of my reluctance to duel: *i* succumbed only after great pressure had been exerted by my adversaries. *i* was not afraid. *i* had always stood up for the truth, and *i* would go to my grave with a clear conscience and hands unstained by patriots' blood. *i* asked forgiveness for those who would kill me. Victims of the coquette, they were good Republicans.

i addressed the letter to Gervais, a prominent member of the Society, and commenced another, to my Republican friends Lebon and Delaunay. *i* asked their forgiveness for not telling them of the duel. My adversaries had put me on my word of honour not to inform any patriot. *i* asked them to prove that *i* had gone through with it against my will, having exhausted all possible means of reconciliation. *i* wanted them to make it known to all that *i* was incapable of lying, even in the most trivial of matters.

Incapable of lying? Why didn't *i* tell them the truth about the duel? Was it to preserve the real Evariste Galois, to raise him from all this sordidness and project him into the future? Would my friends succeed in proving to others that *i* had gone to my death unwillingly? Was such a proof any different from a mathematical proof? In the end a person's life could be reduced to events a, b, c,..., and these events could be grouped, arranged and rearranged to reconstruct a life totally different from the one that had been actually lived, but sufficiently compelling to become the life accepted by posterity. Wasn't that how biographers worked? Wasn't that the basis of mathematics? There might be many proofs of a theorem, all correct,

and yet one would emerge as the most correct, the most compelling, because it was the most concise, the most elegant, the purest. That was what *i* was asking of my friends: to preserve the true Evariste Galois, the one who would never have fallen for a worthless slut.

The eleventh and last toll spread in a widening circle that embraced the city, as though it would crush it, reduce it to the state before all creation - the primal zero. Time was passing quickly. *i* had to start my letter to Chevalier. My last will and testament. *i* had been scribbling again: mathematical symbols, words, initials, letters coupled to form strange characters. *i* wrote 'a woman' then blacked out 'woman', 'logarithm', 'indivisible', 'death'.

From this confusion, a passage from the *Odyssey* leapt at me: twenty or thirty lines *i* had memorised in Greek as a student at Louis-le-Grand. Upon going ashore to the place foretold by the witch Circe, Ulysses excavated a pit, slew the ram and black ewe she had provided, and watched as their blood fused and filled the gaping hole. Suddenly the shades of the underworld began stirring, rustling, twittering, crying, finally clamouring to approach the pit, drink from the warm pool, converse with Ulysses.

i poured a pool of ink onto a blank sheet and watched it spread in being absorbed by the textured paper, its perimeter changing from a circle, to a ragged coastline. Figures and faces began stirring on the black island. The knot in my chest tightened - another seven hours, and then a separation from my hands, my shadow, the sound of my name. *i* thought of father dying in that room. Asphyxiation or a bullet in the heart - it didn't matter in the end. Life flashed past at the instant of death: a red ribbon carefully rolled, only to slip from one's hands and become a tangle on the floor. Was death like that? A return to the beginning? *i* and nothing, one and zero, Archimedes and the Roman. The bearded face of the old Greek appeared in the ink stain. Saint Archimedes, defender of the holy circle, *i* implored him. The sword was raised above my head. Would he help me? Give me courage? He had been eighty when the Roman came, *i* was only twenty. Was it that difference of sixty years that accounted for his equanimity and my fear? But *i* had also experienced those states in which sixty years is like sixty seconds. *i* had also been pure mathematics. Saint Archimedes, *i* called aloud, bowing to the ink. Would he help me attain that state just one more time? Would he fill me with the spirit of mathematics, give me strength to overcome the fear of the sword, so that *i* could write my last will and testament, and catapult my soul into the distant future. The bearded face nodded before receding into the ink - a nod full of encouragement, as if to say the sword had no edge when one was filled with the spirit.

{which transformations one may make, which quantities one may substitute for the given quantities, without the relation ceasing to be valid.}

Another half an hour must have passed, and *i* still couldn't begin the will that was to save my soul. To calm my rising anxiety, *i* poured a little more ink onto a second blank sheet. *i* watched intently as a different face emerged, this one in profile. Indistinct at first, it moved closer hesitantly, until *i* recognised the round forehead, the bony prominent nose, the thin neck. Saint Pascal! Great ascetic! Had he come to show me the way? It wasn't true, was it? He had never really renounced mathematics for the Cross? When a toothache tortured him for weeks, he hadn't been assuaged by faith, had he? No. The spirit of mathematics possessed him again, eased his pain, and for two weeks he worked on geometry, discovering those wonderful properties of the cycloid. For two weeks mathematics raised him above his miserable body and gave him glimpses of eternity. Dear, Saint Pascal! *i* now felt as abject and worthless as that rotting tooth of his. Would he help me? Grant me a few hours of exaltation

of the sort he had experienced on that November night? Give me the strength to rise above my suffering and save my eternal soul through mathematics? But a death cart rattled along the street and the profile lost its definition, faded like a circle on a dark pond.

{This enables us to recognise at once the impossibility of many expressions which we might seek.}

If only *i* applied this theory to the function of my life! *i* might have known *a priori* to avoid the impossible: those hopes and dreams that could never be realised, those paths that led to dead-ends. Perhaps life and theory will always be mutually exclusive. The spirit of mathematics will always be closer to ink than to blood.

{But I have no time, and my ideas are not developed in this field, which is immense.}

Midnight struck, each toll swallowing the one before, until the last seemed to expand into the infinite. The flame stirred. Would there be enough time and oil? But *i* couldn't yet feel the spirit that had moved me in the past. Had it left me for good, as Chevalier had feared it might? Or was *i* incapable of summoning it? *i* had to subdue my anxiety or face a blank sheet for the remainder of the night. *i* poured a few more drops of ink, and in an instant the seed of a third figure appeared. It remained nothing more than a point in the distance for some time, and it possibly may not have moved forward at all but for my silent invocation. The point grew and became a pale young man, who approached shyly, reluctantly. Saint Abel! He stood in the shadow. *i* implored him to come closer. He, perhaps more than the others, could help and guide me out of this dead-end. Youngest martyr of mathematics! Moved by the spirit, he had managed to work under the most appalling poverty, and even the consumption that crushed his lungs couldn't extinguish the fire in his mind. Saint Abel! *i* assured him that *i* had no knowledge of his work when *i* wrote my first paper on equations. The remarkable similarity in our ideas was no coincidence though: both of us had been moved by the same spirit. *i* called him to come closer. *i* wanted us to become blood brothers, ink brothers. We would have achieved so much if fate had given us another ten or twenty years. Dear brother in death, martyr in ink! Now, more than ever, *i* needed his courage and calmness to work through this terrible night and deliver my soul to him. As he receded into the ink, *i* took a blank sheet and commenced.

{Print this in the *Revue Encyclopedique*.}

i was in that state again: pure mathematics, disembodied thought. The duel held no fears: it concerned the puny body, not the swift mind. *i* now saw even death in terms of mathematics. Why not? If it could explain the phenomena of light and gravity, why not life, consciousness, death? How freely it flowed out of me, as naturally as blood from a wound. It was as though *i* were writing automatically, like the writings of mediums who claimed they were possessed by the spirit of dead writers.

What time was it? *i* tilted my head back, turned it this way and that until the bones in the nape of my neck cracked. My hearse would be here soon. The thought didn't alarm me though: after the chaos of the past year, after the madness of the last month, *i* was once again in the temple of mathematics. The lamp on the table casts a halo on the ceiling. The flame was pointed, watchful, the sole witness to my night of Gethsemane. But the oil in the lamp

was low. Would that slender flame see me through? The tip of an arrow, would it ward off the encroaching night until *i* finished my last memoir? The light and the text. It occurred to me that light finds its meaning and fulfilment in the text. Enough musing though. To conserve oil *i* lowered the flame a little, for there was no telling how long it would take to write my last will and testament. The oil might have to see me through to sunrise.

{I have often dared to advance propositions of which I was uncertain;}

i stop and read those words again. No. Now that *i* have a moment to reflect, *i* see that *i* have never been uncertain of any proposition. Expression has always been my shortcoming: in my haste to grasp fleeting insights *i* often omitted what *i* considered trivial links between ideas. Of course, people complained that my work was unintelligible, obscure, worthless. *i* have tried to overcome that tendency in this document, but can one ever fully convey an insight? Maybe the symbols of mathematics, like the alphabet, are at best signs that give directions, and the rest is left to the resourceful reader. Perhaps *i* can help the reader a little here. Scratching, *i* insert the words 'in my life' between 'often' and 'dared'.

The flame is quivering, as though straining to detach itself from the wick, to fly from this dismal room and summon the sun. Are you still here, biographer? *i* haven't managed to drive you away, have *i*? No, your presence is stronger than before. *i* can almost see your features in the flame. Well, *i* suppose there will be others too: people who will try to profit from my mess, who will attempt to reconstruct my miserable life from a handful of letters, several anecdotes, a few school reports, and the frustrated scribbles in the margins of my mathematical works. Why? For my sake? Hardly! For their own material gain or academic advancement. If *i* could only add a legally enforceable clause to this will, a caveat, prohibiting people writing my biography, both those who would undertake a scholarly work based on exhaustive research, and those who would fictionalise me, as some no doubt will. Death should separate the work from the man. The personality should be buried with the body, while the soul, the essence of Evariste Galois, should live forever in these proofs, theorems, propositions.

{but all that I have written here has been in my head nearly a year, and it is too much to my interest not to deceive myself that I have been suspected of announcing theorems of which *i* had not the complete proof.}

i can see it all, just as *i* saw and related to Respail that *i* would probably die over some worthless coquette, just as *i* saw in a flash of intuition the entire theory of equations. The early morning sun will dart through the pine trees. Yes, there will be a pine grove, of this *i* am certain. As *i* step out of the carriage, a finch begins honing its song. Fennel growing on the banks of the lake scents the crisp air. Dew glitters on the grass. The seconds explain the rules, load the pistols, and mark out the distances. It all happens quickly, as though it's a game, a mock duel like those *i* played as a child. At twenty five paces d'Herbinville looks more handsome than ever. He is well groomed, clean shaven, his boots shining in the sharp light. *i* am embarrassed by the shabbiness of my Artillery uniform. He strides over the pine needles, reaches the inner marker, aims and fires. The small sphere of lead claims me, draws my consciousness with its gravity. Division by zero, *i* think, face down on the bristling needles. Perhaps there is only being, and being is a function of time, and death is a break in this

function - a singularity, a point of discontinuity, a vertical asymptote, where, at one and the same instant, the paradoxical nature of being plunges down to the abyss of negative infinity only to shoot up to the paradise of positive infinity. The smell of the earth mingles with gunpowder. There's a sharp pain in my left side. Later, when they perform an autopsy at the hospital Cochin - the nearest hospital to the lake - they find that the bullet punctured my left lung, passed through several intestines and lodged itself in my right buttock. What will others make of this detail in the future? Who knows, perhaps from the bullet's trajectory through my body they will be able to reconstruct the scene of the duel. *i* lie there for some time, perhaps an hour or two, unable to move, feeling the cool darkness coursing through my veins, wondering whether my appointed second has deserted me or gone for a doctor. A fellow in an old officer's overcoat lifts me into a horse-drawn cart and sets off with a loud cry. *i* am on my back, the fellow's coat under my head, the pain in my side like a dagger at each jolt. The sky is strewn with white clouds, and all the way to the hospital *i* am lulled by the words: the calculus of clouds. The hospital room is distorted in the conical stethoscope pressed to my chest. The nurse's starched skirt rustles like crisp paper. Alfred appears, sobbing over me. Only Alfred, neither Nathalie nor mother. Why hasn't Nathalie come, *i* wonder. She came to see me in prison. Perhaps it's better this way. And mother? *i* haven't seen her since...Alfred's eyes are red, and he appears to be drifting away from me, even though he is holding my hand. *i* tell him not to cry, that *i* need all my courage to die at twenty. But *i* regret my words. Alfred is sobbing uncontrollably as the nurse leads him away.

{Ask Jacobi or Gauss to publicise their opinion,}

Immortality in a feather from a dead crow, *i* mused, putting down the quill. *i* blew on my name and date - all finished. My breath was like a puff of hope, of life, blowing the soul of Evariste Galois away from this coffin of a room and into the future. *i* had not felt so calm since *i* was a child, walking hand in hand with father. *i* was at peace with myself, with with the night centred on the tip of the flame, with what would happen in a few hours. *i* gathered the sheets scattered over the table - eleven of them. Was it significant that the number was a prime? The oil would last until they came. *i* tapped the sheets in a neat pile, and, pressing them against my chest, gazed at the halo trembling on the ceiling. Dawn wasn't far off. Absorbed, *i* hadn't heard the bell tolling away the hours. There wasn't a sound on the street now. Let them come, my reflection in the mirror smiled. Everything was in order. Chevalier wouldn't let me down. He would ensure the publication of my work. The great Gauss would grasp at once the importance of my findings, and my soul would be rescued from the grave. And *i*, the flesh and bone Evariste Galois? The person who suffered? Who encountered so many obstacles? Who, on the eve of his death, stared at a blue vein throbbing in his thin wrist? The truth of the work will survive, while the chaos of my life will turn to dust. As it should be Truth and beauty: in the end that was what really mattered. And the rest? The life that produced it? It must retreat without a word of complaint and allow the truth to shine through.

{not as to the truth, but as to the importance of these theorems.}

The doctor's bearded face is a few inches from mine, his warm breath is scented with camomile. Holding my wrist, he concentrates on my fading pulse. But my heart has already given up its life-long count, its collaboration with natural numbers. Imaginaries - *i* can now

grasp these elusive, ethereal quantities, understand the meaning of $i = \text{Galois}$. By nightfall, i will renounce imaginaries for the transcendental, the mystical, π . And by morning, i will go beyond this and embrace zero. Black footsteps walk crisply toward me. Leaning over the bed, a priest places his bag on the sunlit blanket. A pin of light darts from the silver cross on his chest. His fingers become a tight knot. The hairs on the back of his hands are ginger in the light. Perspiration glistens on his brow. He flicks the bag open and prepares to give me absolution. Summoning what little strength i still possess, i refuse it with a harsh: No. This is my last word. i focus on the priest's collar. Christ or x ? The room becomes dark. In the distance a cuckoo is counting. i am circumscribed by a circle of light, prostrate along a vertical diameter, arms stretched horizontally along a chord, finger-tips on the circumference. Suddenly i spring out of the circle. i am a child again, running happily toward mother, eager to tell her that i am able to count backwards to nought.

{I hope, after this, there will be some people who will find it profitable to decipher all this mess. I embrace you with affection.

E. Galois. May 29, 1832.}