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## Departed Quantity

Professor Herzog moved his hands over his desk, plucking at the corners of papers, momentarily resting his fingers on books, as if he were searching for the answer to the question. Steven Smith, the graduate student, stood at the blackboard and waited for him to find it.

“In the literature?” he repeated. The hands suddenly stopped and alighted on the desk. “I think you mean Dombrowski’s Problem.”

“‘Dombrowski’s’?”

“Yes. Hadn’t you heard of it?”

“No, sir.”

Herzog sighed—through his nose.

“Sorry.”

“I’m not your drill sergeant, Steven.”

“I know.”

“And someday you’ll be a professor, too.”

Smith did not answer.

“This looks like Dombrowski’s Problem,” said Herzog. “Write down the diffusion equation again. Now suppose that the domain has no thin necks. If we approach the boundary—and we might as well assume that it’s smooth . . .”

“I see. We lose uniqueness.”

“We *might* lose uniqueness. The equation is singular. That is the problem. And yet, the singularity is not that bad.”

“Do we lose uniqueness?”

“In the computable cases, no.”

“Oh.”

“But in the general situation, we don’t know. I can tell you that settling it either way would be worth a PhD.” Herzog smiled. “I think I have a book you should look at. Here, let me . . .”

Professor Herzog stood up and went to the bookshelves by his window. The window overlooked UCLA’s Bruin Walk.

“Hm. My copy must be at home. No worry. Here’s the title.” He scribbled a note. “It’s in the math library.”

“Thank you,” said Smith. He folded the paper in half and put it in his pocket.

“Did you have anything else to show to me?”

“No. That was all I had.”

Herzog cleared his throat and looked at his watch.

“Let’s meet again, this same time next week. I’d like you to, oh, prepare something on the first chapter of Janson.”

“Janson?”

Herzog gestured toward Smith’s pocket. “The book I just told you about.”

“Okay. Sure. I will.”

“Very good. I will see you next week. Goodbye.”

Smith nodded as he left the office. He returned a moment later.

“What if somebody’s checked it out?”

“Then I’ll lend you mine—for God’s sake. But I’m sure that nobody has checked it out—” he paused “—for a long, long time.”

*Differential Inequalities for Singular Diffusion Processes, and Related Topics*, by L. T. Janson, was on the second floor of the math library. When Steven Smith reached up to take it, he felt a shock.

*New Yorker* cartoons were mounted underneath the circulation desk’s glass countertop. Smith read them while he waited for the girl to notice him. One was of a talk-show host looking offstage toward the approaching figure of Death, and saying, “Well, I can see our time is just about up”; another showed a barbarian king questioning a courtier: “Me? The scourge of civilization? You must be kidding.” Smith laughed.

“The reference librarian’s idea.”

He looked up. “Huh?”

“The cartoons.”

“Oh.”

“Can I help you?”

He handed her the book and his ID.

“How much metal do you put in those things?”

“Excuse me?”

“For the magnetizer.”

“I couldn’t say. Not much, I guess.”

“I felt a shock when I touched it.”

“Really?”

“Really.” He put the book into his backpack.

“That’s the first time I’ve heard of it happening.”

“Wonder why.”

“Guess you’re just the lucky one. Bye now.”

Smith went to the Treehouse—the big snack bar in the north part of campus—and got a hamburger, French fries, and an extra-large coffee. *Differential Inequalities* was so old and well-used that it opened flat on the table and stayed open.

“Damn. It’s been written in.”

There were pencil and pen notes in the margins, underlinings, even arguments with the author (“No! Counterexample in Finney Studia paper”). The notes never obscured the text. They were not even very distracting, or would not have been, to normal people. However, Steven Smith

loved a clean book. Even to read while eating—especially French fries—was somewhat against his principles. But it was either this or wait for Herzog to bring his copy from home, and then how would be ready for the next session? He would rough it.

He had approached Herzog a year ago, midway through his second year in graduate school. It had been a little like having admired a beautiful woman for many months, finally working up the courage to introduce himself, and then, ten minutes later, proposing marriage. Herzog had agreed to become his advisor. He had reassured Smith: “I know you’re smart.”

He remembered when he had begun to be interested in singular diffusion equations. It was in a course on partial differential equations (taught by somebody other than Herzog). One day the professor had discussed SDE’s as a side topic, and illustrated some of their properties. They had been created in the 1930’s as models for the electric fields of clouds of point charges—an idea which had failed. They had been making a comeback in the study of vortices and superconductivity.

Steven Smith was not interested in physics or applied mathematics, which was why he had not thought of Herzog at first: Herzog was known mainly for his work in computational fluid dynamics. It was only when he learned, through an accidental remark, that Herzog had done fundamental work on SDE’s, that he began to think of him as a possible advisor.

Fifteen years ago, Herzog had published a partial solution to (what Smith had learned was called) Dombrowski’s Problem, which was still the best such result to date. Herzog had already been famous then. There had been rumors that he would win a Fields Medal—the mathematical equivalent of a Nobel Prize. But, at the International Congress of Mathematicians the following year, Herzog did not get one. When the next Congress met, four years later, he was past forty and, according to the informal rules of the award, ineligible.

He had done more work on SDE’s in the early 1980’s, and had then moved by stages into computational mathematics. His work was highly regarded, but nothing else he had done was like that Dombrowski gem.

Smith looked up and saw that it was getting dark: winter days *were* shorter, even in Los Angeles. He carefully wiped his hands on six or seven paper napkins before he dared to pick up the dog-eared, waterstained book and put it in his backpack. He walked to the bus stop at the top of Hilgard Avenue.

Sitting under the fluorescent lights, he thought about the handwritten notes, and was puzzled by them. Like all mathematics, the book and the notes had been unintelligible to him on the first reading. But he had sensed that the notes were not merely vandalism. They were somehow serious; as if, when they disagreed with, commented on, or amplified the text, they were contending with it as an equal, and knew it.

Who could write such notes? Only Herzog, here. But why? Smith pulled the book out—he believed he knew Herzog’s handwriting well enough. The book flopped open to the blank page that followed the index. Something was written there. The words stood out in the acid light: “Whoever has this book, has me.” It did not look like Herzog’s hand.

It was not Herzog’s handwriting. Herzog’s script was distinctive, and so was this: a mixture of printing and cursive, with ‘a’s and ‘g’s that looked typed. Smith quickly became grateful for the little notes. *Differential Inequalities* was badly written. Along with many insidious typographical

errors, there were incomplete proofs, a large number of false “remarks,” and at least a dozen citations of works in the text—by author and year only—that were not listed in the bibliography. The anonymous annotator had corrected the errors, supplied the missing references, and in places even expanded on the book’s terse exposition (“ Cf. conservation laws in  $\mathbf{R}^3$ . *Same proof* in general case!”). Smith believed that he could have read the book without the help of the notes—but with much more labor and frustration. He wondered: What must *he* have gone through?

The notes were quirky. Mixed in with the straight mathematics were expressions of disgust at Janson’s carelessness, and eccentric metaphors that worked to elucidate the books’s rote-learned formalism. Things like:

$$\int_{\Omega} \phi \, dx = 0 \rightarrow \text{big wobbles \& no go.}$$

“He means the *upper* part. See Allred, *Acta*, 1952, p. 208.”

“Does not say what happens when cone flattens out. But works. Use Hardy’s Inequality on radial lines.”

“Harmonic measure on an alligator bag. Proof is, pop the bubbles one at a time (what (5.3) means). Hold on and pray. Convergence because  $(5.4) < \infty$ .”

“Janson OK here (miracles are real).”

He guessed that the writer was young. For some reason he pictured him as skinny, of medium height, with glasses, and with crew-cut blond hair that stood up straight—the correct phrase was “shock-headed.” He supposed that the shapes of the letters had reminded him of somebody he had seen in a movie. He worked through the first chapter, in preparation for his presentation to Herzog, and saw confusion after error after logical gap mended by the mysterious annotator. He began to see him as an almost heroic figure—his own Arne Saknussem.

When Smith finished his presentation the following Thursday afternoon, Herzog told him, “You seem to understand this subject very well. I must congratulate you.”

Smith smiled—the first time he had smiled in Herzog’s presence. “I wish I could take credit for it. But, um, I had some help.” He pulled out the book and set it on the desk.

Herzog raised his eyebrows, and rested his fingers on the cover.

“I don’t understand. Didn’t I *tell* you to use Janson?”

“Look inside.” Smith bit his lip.

Herzog opened the book to the middle. He sucked in a short breath; he blinked.

“Doesn’t the library have a cleaner copy?”

“Unfortunately, or fortunately, no. Janson really isn’t very clear. Those notes are excellent. They’re better than the book, in fact. Let me show you what he does on page 30.”

Smith reached over the desk to pick up the book; but Herzog’s fingers were holding it down like a clamp.

Herzog lifted his hand.

“Yes. I’m sorry. Please show me.”

Smith did so.

“Very elegant.”

“I was wondering, would you happen to know who wrote them?”

“No. I haven’t any idea.”

“You know, when I first saw them, I thought that maybe you had written them.”

“No, not me.”

“But then I saw that it wasn’t your handwriting.”

“That is correct. That is not my handwriting.”

Steven Smith worked late in his basement cubicle that evening. Like most of the graduate students, he did free-lance math tutoring. A student came by for a session at seven o’clock. After he left, at eight, Smith read in Janson.

He was falling asleep by nine. Four of the other graduate students had told him they would be by between nine and ten, and they would all go out to the Killer Koala, Westwood’s new quasi-counterculture restaurant (the street sign read, “KILLER KOALA/ Tacos–Pizza–Greek Food”). They had promised to take Smith home afterwards. That was his chief reason for going to the KK: he hated to wait for the bus in the cold. But if he did not have some coffee soon, he would be asleep when they arrived.

He taped a note up and took the elevator to the sixth floor. The math lounge was open. Smith turned on the kitchen lights, found the instant coffee and a clean mug, put a quarter into the money box, and made coffee in the microwave. He sipped it while leaning in the doorway that led to the lounge proper.

The lounge was not entirely dark. In the farthest corner a single light shone down on a young, blond-haired man who wore black-framed glasses. The man’s thin forearms were crossed on his lap. He was looking at his feet.

“Hello?” Smith called.

The man looked up.

“Are you waiting for someone?”

The young man grinned, as if he were holding back a laugh or keeping a secret.

“Don’t mind me. I’m not really here.”

“Excuse me?”

“Shouldn’t you be going?”

Smith glanced at the kitchen clock. He swallowed his coffee and ran to the elevator.

Two grad students were waiting outside his door.

“Where are the other guys?”

“They went up to get you.”

A few minutes later the others returned, and they started to walk down into Westwood Village. When they stopped for the light, at the bottom of the campus, Smith asked, “Any idea who that guy was up there?”

“Guy up where?”

Ten days later Smith was well into chapter two, which introduced Dombrowski’s Problem. With the help of the notes, he soon mastered the classical cases, in which the domain of definition had plenty of symmetry and a fairly smooth boundary: a sphere, an infinite cone or cylinder, a half-space. The Dombrowski functionals of these domains could be calculated explicitly, and then it was easy to show that the SDE always had a unique solution, regardless of the boundary data. He worked through the four standard examples in Herzog’s office that Thursday. He was so pleased

with his own presentation that he half-expected Herzog to applaud, lightly: he pictured him tapping his fingers against his palm. But Herzog only smiled. The smile seemed to appear on his face the moment Smith looked at him.

“Very good. Next week we shall see how you do with the perturbed cases.”

“Yeah.” Smith tried to grin ironically. “I’m just *dying* to get into those.”

Herzog responded: “Then I will see you next Thursday.”

“Just one more thing.”

“Yes?” Herzog had already got a book out and opened it on his desk.

“I’ve been thinking about this problem, and I’ve been thinking that, if I’m going to get some insight into it, it might be a good idea to do some numerical work, on the computer.”

“That’s right,” said Herzog, looking up.

“Thank you. The trouble is, well, I have two troubles. The first is that my computer account is too small to handle big jobs like this; and the second is—I hope I don’t sound too lazy—writing one of these programs from scratch will take an awful lot of time. I was just wondering if you could direct me to some software . . .”

“I can solve both of your problems,” Herzog said. “My grant will pay for your computing costs, and I have a program that should be just what you need. I’ll e-mail it to you. I can put the documentation in your box.”

“Thank you.”

“What is the name of your account?”

Smith told him and Herzog wrote it down.

“Well and good. I’ll send the file sometime tomorrow—I’m tied up this afternoon. You could probably start working this weekend.”

“Ha.”

“I’ll see you next week.”

The program arrived the next morning, along with a message from the Computer Center telling Smith that his account limits, in disk space and CPU time, had been increased to what seemed astronomical levels.

He tried printing the program, simply out of curiosity, but all that came out were a few broken and widely spaced lines of happy faces, card suits, and Czechoslovakian consonants. That meant that the program was probably written in machine code, instead of a programming language like PASCAL or FORTRAN, and he would not be able to modify it. Fortunately, Herzog’s documentation was detailed and clear. Smith was able to test the program on the classical examples that Sunday evening. He got the expected answers: that felt good. Then he decided to try something more exotic. He set it to solve a problem in which the boundary of the domain had a small, asymmetrical kink. Herzog’s writeup had mentioned a command by which he could keep the program running while he was logged off the machine. The program would give him the output, if it had it, when he came back on. He typed it in, logged off, and went to get some coffee.

It was seven-thirty, and the lounge was dark. There was a bank of switches on the wall near the kitchen door. Smith turned them all on. The lounge was empty.

He had not seen the odd young man since that night, over two weeks ago. Not unusual: many of the female graduate students had weird boyfriends who were themselves graduate students at

other schools. Hence his saying, “I’m not really here.” (And, the first visit to California *could* be a shock.) No doubt, after a few nights of passion and pizza, he had flown back to wherever he belonged.

Smith gazed into the brightly lit, empty room. He heard himself say, and the next moment wondered why he had said it: “Going? Going where?”

He returned to the computer lab at a quarter to eight. When he logged on, the computer told him that he had new e-mail and that the program had finished its run. He displayed the output. It was a table and a series of graphs. The kink had affected things much as he expected. Sharp ripples radiated out from it but were quickly damped down. At least he was (probably) using the program correctly.

He read his e-mail.

MESSAGE RETURNED (19:38:32) ADDRESSEE UNKNOWN: DYKE912@MATH.UCLA.EDU

“Huh?”

He rarely sent e-mail. He could not think of anybody at UCLA with an address that he might have mistyped as DYKE912. Nor could he think of when he might have sent it. Usually it took only a few minutes for misaddressed e-mail to come back.

He displayed the message. It was all numbers and machine code symbols; not very long. It looked like a glitch. He deleted it.

The girl at the circulation desk was reading a novel, and yawning.

“Excuse me.”

“May I help you?”

“Yes. I don’t know. I was wondering, do you keep track of who’s checked out books?”

“What?”

“Let me say it again. How long do you keep a record of who has checked out a book?”

“I’m afraid I’m not getting you.”

“You see this book?” Smith put *Differential Inequalities* on the counter and opened it to the back. “Can you tell me who last checked this book out before me? I’ve got it out now.”

“Uh-huh.” She looked at the stamped dates. “Why do you want to know?”

“It’d take a long time to explain.”

“I don’t know how long we keep our records, really.” She turned around. “Tom, can you come here? This man has a question.”

A balding middle-aged man came to the counter. “What is it?”

“This man wants to know how long we keep records of who’s checked out books.”

“Exactly ‘how long’ are you interested in?”

“Sixteen years.”

“You’re out of luck. Uh, why? If you don’t mind my asking.”

“No. I’m a graduate student in mathematics, and I’ve been reading this book. You see these notes in the margins? I want to find the guy who wrote them. Or her.” He glanced at the girl. “The ink looks kind of old. And the dates—see? Each three months apart, and about sixteen years ago. It had to be a grad student, checking it out term after term. I want to find him, ask him some questions. He was working on the same thing I’m working on.”

“I’m sorry. I don’t believe we can help you. But you might try the reference desk.” The man pointed. “Charley might remember; he’s been here a long time. He’s wearing the vest.”

“I see him. Thanks.”

“Don’t forget your book.”

“Don’t recognize the handwriting; don’t recognize the book. Have you tried looking in the *Abstracts*?”

“What?”

“The *Abstracts* of the AMS. There’s a chance he might have published a paper then, presented something at a conference, something like that. It’s an off chance. How active is this area?”

“You mean this particular area? Not very.”

“Well then, you’ve got a good chance of being able to narrow it down to a few names. You could look them up.”

“Thanks.”

“Don’t forget your book.”

Smith started with the bound volumes of the *Abstracts* of the American Mathematical Society for 1972, and scanned through the listings that dealt with SDE’s. As expected, there were not very many. When he got to the end of the volume he had a list of only five names, two of whom he was sure were too old to be the man.

He scanned: he did not read. But even scanning was arduous. The volumes were from the days before computer typesetting. Many of the entries were badly typed. Quite a few were handwritten. He slogged through the first quarter of 1973 and then closed the book. He laid his head on it.

It was a magnificent, idiotic obsession. The notes hinted that the annotator had also done some numerical work on Dombrowski’s Problem. The earlier remarks were consistent with what Smith had seen, using Herzog’s program, but the more recent ones were puzzling, as if the annotator had encountered some wholly unexpected phenomena for certain domains. But which domains? And what phenomena? The notes suggested things, but for the full explanation, “there was not room in the margin.” Smith opened *Differential Inequalities* and idly flipped through it, holding it sideways, while resting his head on the volume of *Abstracts*.

He suddenly sat up. He had just seen that handwriting, a few minutes ago. He opened the *Abstracts* and carefully searched backward from where he had stopped.

It was listed under “approximation theory,” which was why he had not seen it before (he had been looking under “numerical analysis” and “partial differential equations”): “Some numerical experiments related to the Dombrowski functional, with connections to non-convex approximation theory.” The author’s name was John Peter Wirt.

He yelped. He clapped the book shut. Other people turned to stare at him. He smiled back. It was as if he had given a name to a spirit.

“Hello. Registrar’s office.”

“Hello. I’m calling to see if you have any information about a former student here, named John Peter Wirt. That’s W-I-R-T. I’m a graduate student in mathematics, you see. I’m interested in some things that this guy Wirt did in the early 70’s, and I haven’t been able to find him in the

AMS directory or anyplace else. I was hoping that you might know where he went when he got out of here.”

“You want Alumni.”

“Alumni.”

“Hello, I’m Steven Smith, I’m a graduate student in mathematics. I’m looking for the address of an alumnus named John Peter Wirt. Can you help me?”

“Wait a second.”

He was put on hold.

“Thanks for waiting. Could you spell the last name?”

“W-I-R-T. John Peter. He was here in the 70’s.”

“Coming up now. Hm. Did not graduate.”

“What?”

“That’s right. Did not graduate.”

“How in the world . . . Do you have his address?”

“No current address.”

“None?”

“None. Wait. There’s something funny here. Larry, what does this mean? Could you please hold a second.”

He was put on hold again.

“Sorry. There’s apparently something about him in one of the old *Bruins*. Somebody’s checking on it. We can call you back.”

“When will that be?”

“A few minutes.”

“Here’s my number.”

Smith hung up.

He had taped a photocopy of the Wirt abstract up on the wall of his cubicle, directly under his poster of Big Sur. He had read it many times: he found it enormously suggestive:

*John Peter Wirt, University of California, Los Angeles, California 90024. PRELIMINARY REPORT. “Some numerical experiments related to the Dombrowski functional, with connections to non-convex approximation theory.” We present a scheme for efficient computation of the discretized Dombrowski functional. We report on results of numerical approximations of the functional for polynomial boundary data on certain non-smooth, non-symmetrical domains. Our computations indicate that the level hypersurfaces in such cases are manifolds of slowly varying negative curvature, which intersect the boundary transversally. We describe a connection to the Dombrowski Problem. We present applications of our method to problems in computational non-convex approximation.*

It was a “folk theorem” that, if the level hypersurfaces always intersected transversally, then one had uniqueness in the Dombrowski Problem. Smith remembered the waves that had radiated from that boundary kink: *they* were transversal. But what was the importance of “slowly varying negative curvature”? Wirt must have been doing something more—much more—than brute number-crunching. Perhaps he had found a way of framing the problem geometrically . . .

The telephone rang.

“Hello?”

“Steven Smith?”

“Speaking.”

“We found that story in the *Bruin*, about John Peter Wirt.”

“Yes?”

There was silence.

“What did it say?”

“It said he committed suicide.”

“Oh. God.”

“I’m sorry. Did you know him?”

“No. I just know of him. I sort of know his work. When did it happen?”

“Um, 1973. I can’t tell you much more, I just glanced at the story. We could send you a copy if you like.”

“Yes, please. I’d appreciate that. Thanks. Steven Smith. I’m at the Department of Mathematics.”

“Ohhh-kay. Really sorry we couldn’t help you find this guy.”

“In a way, you did.”

“Yeah.”

Earlier in the day, Smith had logged on to run Herzog’s program. The computer lab had been packed. A computer-assisted design midterm project was coming due, and the students had priority. Smith had only had time to set up the problem and start the run, before yielding the terminal to an engineer. Three hours later—immediately after talking with the Alumni Office—he returned to the lab. The engineer had not moved from the chair.

“Excuse me. Do you mind if I log on for a bit, just to see what I’ve got? I won’t be more than five minutes.”

“Can’t you wait till tonight?”

“That would mean catching the bus home, so I can have dinner, and then coming back.”

“How far away do you live?”

“Come on, it takes half an hour to get there.”

The engineer typed a command. The sphere on the screen flattened into a discus.

“All right. Let me save this first. But only five minutes. If you’re not off in five minutes, I’m pulling the plug.”

“Fair enough.”

Smith logged on. The program had finished, and he had new mail. He skipped over the tables and displayed the graphs. There was that transversality again, even on a twisted boundary. He would have to try it in higher dimensions when he had more time.

“You’ve got two minutes left.”

He checked his mail. There were two items. The first was a returned message—sent to DYKE912 again. Just as before, it seemed to be nothing but numbers and machine code. The second item was from a user named INKEPER. It read, “Run this: *decode mail.dyke912.*”

Smith exited “mail.” He glanced at the engineer, who was watching the clock. He typed in the command.

The screen changed to a field of scattered symbols—the DYKE912 letter—with a highlighted sentence at the bottom: “Press any key to begin.” Smith hit the return.

A flickering appeared at the top and moved down the screen. Thin line by thin line, the DYKE912 letter was transformed into Smith’s output from the Dombrowski program. When the flickering reached the bottom, the DYKE912 letter came back, and the process repeated itself. It started a third time.

“What the hell.”

“What?” It was the engineer.

“Could you, could you come look at this?”

The engineer smirked and walked around to Smith’s side.

“So? You logged yourself off.”

Smith looked back at the screen. The system prompt was blinking at him. He got out of the chair.

“I’m done. You can have it.”

Upstairs, in the library, there was an hour before the reference desk closed.

“You’re Charley, right?”

“Charley Gordon.”

“‘Charley Gordon’ . . . ”

“If you’re wondering where you’ve heard it, he’s the hero of ‘Flowers for Algernon.’”

“Oh, yeah. That Charley Gordon.”

“You’re the guy with the book, aren’t you?”

“Yeah. I’m trying to solve a problem, and I wonder if you could help me. Oh, my name is Steven Smith.” They shook hands.

“What, exactly, is your problem? I don’t guarantee I’ll understand it.”

Smith gave a vague explanation of singular diffusion equations. Charley said, “It sounds like the sort of thing Herzog used to do.”

“He still does, a little.”

“I thought he was all computers now.”

Smith shrugged; really, he did not know.

“What are you looking for?”

“*Anything.*”

“Well, we do have an online Reader’s Guide. You could try a keyword search.”

They walked over to a terminal and Charley showed him how to use it.

“What keywords should I try?”

“Hey, I don’t know. You’re the mathematician.”

Forty minutes later, when Smith got up to leave, Charley asked, “Find anything?”

“No, nothing.”

“That *is* too bad. You’re a Herzog student, aren’t you?”

“Yes.”

“Do you like him?”

“He’s a good advisor.”

“I guess he could be,” said Charley. “He’s funny. He’s American, but he tries to act European. I think it’s partly his name. In German, ‘Herzog’ means ‘duke.’”

“I didn’t know that.”

They were standing at the circulation desk—Charley was leaving, too. Smith was reading the *New Yorker* cartoons.

“Did you ever know a guy, a grad student, named ‘Wirt’—W-I-R-T?”

“Wirt? Let me think. ‘Wirt.’ That’s German, too. Means ‘innkeeper.’ When . . . What’s wrong?”

“What?”

“You looked like somebody poked you with something.”

“I’m all right,” Smith said. “Do you remember him?”

“When was he here?”

“Fifteen, sixteen years ago.”

“Before my time. Sorry.”

Smith had his weekly session with Herzog the following afternoon. He went through the middle third of the second chapter of Janson, presenting and commenting on the proofs and examples. As always, he owed much of his proficiency to the marginal notes, and he said so. That got him—or Herzog: he could not remember who brought it up—onto the subject of numerical experiments. He described his results in general terms—sketched some graphs on the blackboard—and finished by mentioning the possibility of a geometric approach to Dombrowski’s Problem. He described, as well as he understood it, the connection between the sought-for transversality and the slowly-varying curvature of the level hypersurfaces.

“Interesting idea,” said Herzog. “Is it original with you?”

Smith cleared his throat.

“I wish I could say it was. I owe it to the guy who scribbled in this book.”

Herzog raised his eyebrows.

“I found out his name. I found an abstract by him—same handwriting. His name was John Peter Wirt.”

“Really.”

It was not quite a question. Herzog was looking down at his hand. His fingers were plucking at the edge of the desk.

“Why ‘was’?”

“Well, he committed suicide.”

“That’s right,” said Herzog. “I remember Wirt, now. He was a student here. It must be twenty, twenty-five years ago . . .”

“I think it was closer to fifteen.”

“Yes, that does sound right. Wirt. I knew him. He did this?”

The Janson book was lying open on the desk. Herzog turned it toward himself.

“I’m certain of it.”

“Poor Wirt. I remember, I could see that he had ability. I thought that he might have some imagination. But he wasn’t tough enough. He took mathematics very personally.” He closed the

book. “Poor devil.”

“Yeah.” Smith started to gather up his things.

“Could I ask two favors of you? First, would you mind if I borrowed this book for a couple of days? I think that *I* might learn something from it.” He chuckled. “I promise to bring it back on Monday . . . Unless that would inconvenience you.”

“Monday would be okay. Sure.”

“Thank you. My second favor is, I wonder if you might send me some of your output files. These graphs of yours—” he gestured toward the blackboard “—are very intriguing.”

“That’s no problem. Your address is ‘herzog’?”

“No. Don’t send them there. I have another account, on one of the new SUNs—it’s a little faster with the graphics. The address is ‘duke’—that’s D-U-K-E—‘nine-one-two.’ Could you send them there?”

Smith was bending over his backpack. He deliberately took a long time with the zipper, before turning his face toward Herzog.

“What was that again?”

“Duke nine-twelve. Here, let me write it down.”

Herzog had already picked up a pencil.

“There’s no need,” Smith said. “I’ll remember it.”

He was still looking at Herzog.

“Is something wrong?”

“No.” Smith went to the door. He wanted to get out. “I’ll send them to you.”

“Thank you. I’ll be very grateful.” Herzog’s expression had not changed. He was looking down at the book. “Wirt. I’d never have expected this of him.”

“A remarkable person.”

“Yes,” said Herzog. “Very remarkable.”

Smith stopped in the mailroom on his way downstairs. He did not have to, but he went to look at a typewriter keyboard anyway. Yes, the U and the Y were next to each other. Almost certainly, Herzog had planted a mole in the Dombrowski program, one that would have mailed Smith’s outputs straight to him, if he had not mistyped the address. Smith was ashamed for his advisor.

*Ex-advisor.*

He found himself standing next to his mailbox. The only thing in it was an interdepartmental envelope from the Alumni Office. He unwound the red string and pulled out two clipped-together sheets of paper.

It was a photocopied story from the *Bruin*. The headline said, “Math Grad Kills Self.”

Smith read the story.

“John Peter Wirt, a second-year graduate student in mathematics, was discovered dead in his apartment last Sunday. Police have ruled his death a suicide.

“LAPD officers were called to the apartment after neighbors had called reporting an odor. The body was found in the bathtub. Wirt had slashed his wrists.

“Wirt came to UCLA in 1970. In the fall term he passed the second two, of the of the required four, qualifying exams for the PhD, and it was believed that he would soon begin work on a thesis.

“Wirt was well-liked by his peers and thought highly of by those faculty who knew him. ‘He showed a lot of promise,’ said Professor Don Lorgnette. ‘He probably wasn’t ever going to be a star, but you would have heard of him.’ Jay Campanato, a third-year graduate student and his officemate, said, ‘Johnny was easy-going. Sometimes he seemed kind of innocent. I think that’s partly why he was such a popular teacher. Unlike some people around here, he didn’t try to intimidate students.’”

The story continued on the second sheet. Smith flipped to it.

“What the hell.”

There was a photograph of Wirt: he had short blond hair, black-framed glasses, and the same face as the man from the lounge.

“None of Wirt’s friends could name a possible motive for his suicide. ‘He did take things personally,’ said Lorgnette. ‘But he was quiet, kept to himself.’ Campanato agreed: ‘If a student cheated on an exam, Johnny would feel betrayed—more hurt than angry. He took it as a personal failure. I guess he believed that he ought to be a good enough teacher so that nobody would want to cheat.’ When asked what might have moved Wirt to take his life, Campanato said, ‘I can only guess that he must have been terribly let down by someone. Although, who would want to do that, I can’t imagine.’

“A memorial service will be held Saturday at 3 PM, at St. Alban’s Episcopal Church, Westwood.”

Smith tutored that night. After the student left, he noticed that a deep languor had come over him. He suddenly realized that he had been working furiously hard during the last four weeks—ever since checking out that book—and all the while teaching and taking classes and tutoring. He wondered how he had done it. He felt as if a great source of energy had departed from him.

He re-read Wirt’s abstract. He had not found out its secret, but he would. He was learning what it meant to invest one’s soul in a research problem, as Wirt had done: “Whoever has this book, has me.” And he thought, *Herzog has him now.*

Steven Smith learned of Herzog’s death the following Monday afternoon. The professor had been found slumped over an open book and many pages of notes. He had had a heart attack. His face, it was said, bore a peculiar expression: not of pain, but of profound surprise—as if he had encountered a mystery.