
The Red Badge of Courage

I remember that day as if it were yesterday. I will never forget it. Often, I wake up at night, in sweat-soaked sheets, screaming “Look out Sarge, look out!” Often my roommate is screaming, too. “Shut up, shut up!” But I can’t shut up. I have to tell the story, the story of that fateful day. A day that can never be forgotten.

We were fresh out of boot camp, Leftie and me. Hardly knew an integral from a derivative. We thought the power rule was complicated. Just a pair of snot-nosed calc students. But they said we were ready for Calc II. How ridiculous that sounds now.

We arrived in the country and were assigned to a unit of misfits. Sarge was the only one of us who had seen real combat before. She had fought in WWW I, a web-based trig course. And then there was Pipsqueak, Pops, Leftie, and me. They called me Kodowski. I wanted them to call me Trixie. But they refused.

Before we had even finished unpacking our gear, we heard a yell. “Incoming!” Grunts dove for cover. Sarge just kept eating her granola bar. “Relax,” she said. “It’s just a quiz.” I stayed low anyway. It seemed dangerous enough to me. But it wouldn’t be long before I understood the difference.

I remember that fateful morning as if it were yesterday. I woke to something dripping on my forehead. Leftie had wet the upper bunk again. He gave new meaning to the words math anxiety. I pulled him off his bunk and we had a quick shoving match. Then we threw on our uniforms. No time to brush teeth or comb hair. Ours or anybody else's. Destiny waits for no one. As we stumbled toward the front line, ominous clouds hung low in the sky.

We found the rest of the unit near the frontline. Pipsqueak looked like she was going to lose her breakfast, and Pops' hands were shaking. (He was a continuing ed student.) Sarge munched on a Pop-Tart nonchalantly. Was she really that unconcerned or was that the impression she wanted us to have? I didn't know for sure, but the Pop-Tart sure looked good.

As we spread out over the lecture hall hunkering down in our foxholes, I felt queasy myself. This was it. The real thing. no more training sessions with dummy problems whizzing overhead, and a solutions manual available for cover. This would be live ammunition exploding around us. Everyone else looked as frightened as I felt. Now, we find out what you're made of, I thought to myself, as the hour struck and the general down front signaled the beginning of the battle. I gulped once and turned over the cover page.

A couple of partial derivatives whistled overhead, and I thought to myself, I can handle this. I started firing, plugged a couple quick. Hey, no worse than an afternoon of video games, I said to myself.

Then I came up over the next page, and swallowed hard as I found myself face-to-face with an armored series division. I didn't even stop to think. I just peppered them with Ratio Tests. A few went up in flames. The rest rolled forward. I switched to Root Tests, spraying them indiscriminantly. A couple more went down but the rest rumbled forward. So I lobbed in a couple of Basic Comparison Tests and a Limit Comparison Test or two. Then I let loose with the Alternating Series Test and followed up with half a ton of n th-term tests. That ought to do it, I thought as I waited for the smoke to clear. But among the littered carcasses on the field before me, there still stood one lone series. At first I couldn't make it out. But as it lumbered forward, I suddenly realized what this monstrosity must

be. It was the dreaded harmonic series. It looked right at me and then let out a howl that turned my bowels to ice.

How do you stop the harmonic series? I tried desperately to remember. We had talked about this in basic training. My instructor's voice echoed in my head, "Pray you never see a harmonic series in battle. They are the nastiest, the ugliest series you will ever see. They diverge, but just barely. There is only one thing to do if you ever find yourself looking down the barrel of the harmonic series. . . ." Yes, yes, I thought, as I waited for the voice to finish its explanation. "Use the integral test."

"See you in hell," I screamed as I pulled the trigger. The series blew into a million pieces. I laughed maniacally. "Now that's what I call a divergent series."

Soldiers in adjacent foxholes said, "Shhh," and the general down front gave me a concerned look. I turned the page, and took a triple integral right in the gut. I rolled out of my seat and down three steps of the auditorium stairs. A medic, must have been a TA no more than 22 years old, rushed over.

"Are you all right?" she asked, a concerned look on her face.

I felt for the wound in my belly, but miraculously, my hand came out clean. "It must have hit me in the belt buckle," I said as she helped me to my feet. She handed me my helmet and gave me a strange look. She was probably wondering how anyone could survive a triple integral. But stranger things have happened. I retook my seat.

There was a noise behind me. I looked around just in time to see Leftie turning tail and heading for the exit. "Leftie, get back here," I yelled. "They'll court martial you for sure."

The neighboring soldiers shushed me again. Afraid I would attract ordinance. I should have known Leftie wouldn't have the guts for it. Ever since that quiz problem on improper integrals, he had had the shakes.

I leaned over the exam and a word problem went off right in my face, something about length plus girth of a package at the post office. There was red ink everywhere. I waved the medic over and pointed

at the problem, but she said, "I'm sorry. I can't help you." I guess there were grunts hurt worse than me. I pulled off my helmet and tied a bandana around my head. It was a sea of red ink out there. The noise was deafening. I started working on the problem in spite of the pain.

At one point, I happened to glance over at the Sarge. She didn't look right. I gave her the thumbs up sign, but she didn't respond. She looked like she might be sick. She was slumped down in her seat. I couldn't see it, but I had to assume there was a pool of red ink on the exam in front of her. I realized she must have taken one in the gut.

She was the one who had come up with my nickname, Kodowski. Granted it was my last name, but it had meant a lot to me the first time she called me that. She had saved my ass at least a dozen times already. And now I was losing her, and there was nothing I could do about it. The frustration welled up inside me, and suddenly I roared. Something inside me snapped. I was no longer a human being. I was a calculus-killing machine. I flipped the page and mowed down eight partial derivatives. I turned around and nailed three limit problems before they even saw me. I took out a triple integral in cylindrical coordinates. Nothing could stop me. Three chain-rule problems turned to run, but I never gave them the chance. I flipped page after page, charging forward. I was singlehandedly turning the tide. Suddenly I realized the battle was almost over. I triumphantly flipped the last page and found myself face-to-face with the nastiest triple integral problem I had ever seen. It was a volume inside a sphere but outside a cylinder; the famous cored apple. But it said to do it in spherical coordinates. You have to be kidding, I thought to myself. What twisted, devious mind would create such a diabolical weapon? I had no idea what to do.

But then I remembered Sarge's words. "You can't come at a problem like that directly. Come at it from below. One step at a time."

"Yeah, Sarge, I remember," I said out loud. I first figured out the equations for the sphere and the cylinder in spherical coordinates.

One step in front of the other, Sarge. Then I looked at the intersection. "It's described by an angle, Sarge, I know." I wrote down the triple integral. Sarge's words echoing in my ears. "Don't forget. $\rho^2 \sin \varphi d\rho d\varphi d\theta$ in the integrand."

Don't worry, Sarge. I won't forget that for as long as I live.

And then it came down to just pulling the trigger. The integral could essentially do itself. I circled my answer in bright purple ink. Then I flipped the exam closed, stood, and walked down to the front of the room. The general looked at me nervously.

"Are you proud of yourself?" I said. "All these young lives, wasted. Littered on the field of battle. Never again to raise a pencil for mathematics. Do you feel good about that?"

He looked confused.

"Here is your stinking exam," I said as I threw it down on the table. He stood open-mouthed as I turned and walked up the steps.

We lost them all that day, Sarge, Pipsqueak, Pops, and Leftie. They became Psych majors. I still see them in the halls sometimes, but they never meet my gaze. The math walking wounded.

I was awarded the silver cross to hang on my A, making it an A+. I was promoted, too. They made me a grader. They wanted me to go to officer's training school at Princeton or maybe Berkeley. And maybe someday I will. Maybe that would make it all worthwhile. But I have to get over the nightmares first. I have to reconcile my victory with the loss of my friends. I have to see mathematics as a tool for good, not a weapon of destruction. Then, and only then, will I be able to move on.

Phone Interview

John: Hello?

Dick: Yes, hello, is this John?

John: Yes, it is.

Dick: Hello, John, this is Dick Dermott calling back. I'm here with the hiring committee on the speaker phone. Let me introduce them.

John: Sure.

Dick: Seated to my right is Angela Ambertrout. She's a number theorist.

Angela: Hello, John.

John: Hi.

Dick: And to her right is Eric Enders. He is a logician. We like to kid him that for a logician, he is surprisingly illogical.

Eric: Ha, ha, yes, Dick's a kidder all right. Nice talking to you, John.

John: Hi.

Dick: And finally, last, but certainly not least, is Bob Klakity, sitting to my left. He was a geometer, but now, he's a muckety muck administrator. Isn't that right, Bob?

Bob: Ha, yes, I'm now the Dean of Arts and Sciences, but I check in with these jokers once in a while, just to make sure they haven't destroyed the department.

John: Nice to meet you.

Dick: And as you know, John, I'm chair of the department and my specialty is algebraic geometry. Of course, we are all familiar with your research, having read through the details of your file. But perhaps you could explain in more detail what you are working on to the committee. We're a diverse bunch, so please speak in monosyllable words only.

John: Ha, ha. Okay, sure. Well, I am interested in dihedral submonomorphoids defined over bilateral Bernoulli shifts. Although factorization theories for laterally subcutaneous rungs have existed since the early days of fibroid extensions, it is only in the last few years that lifts to hyperextended lower centralized series have allowed a complete classification of Alexandroff polyhedra in the category of ramified idempotents...

Eric: Hey, John, this is Eric. Sorry to interrupt, but are there any faces here?

John: Well, yes, the Alexandroff polyhedra have faces.

Eric: Can you lift them?

John: Well, yes, assuming that the fundamental group is locally extendable.

Eric: You know what that would be? A face lift. Get it? Oh, God, that's good.

John: Ummm, yes. That is funny.

Dick: Don't mind Eric, John. He's a bit of a joker. Please go on.

John: Yes, well, okay, as I was saying. It is only in the last few years that lifts to hyperextended lower centralized series...

Bob: Angela, didn't you hyperextend your thumb a couple years back?

Angela: Yes, Bob, I did. Hurt like a bitch. Had to wear a splint for a month.

Bob: Hey, John, maybe you should consider a splint for your hyperextended thingamajig. Is there a mathematical object called a splint?

John: Ummm. Not that I know of.

Bob: Well, we could make one up. Maybe we could do some joint work on that, publish a paper.

John: Ummm. Well, maybe...

Eric: Bob wrote three papers with our last junior guy, what's-his-name, the one who didn't get tenure.

Dick: The skinny guy who always looked depressed? I can't remember. Started with an 'S', I think.

Bob: It was Shoemaker, or Shoestring or something about shoes. All I cared about was that it came after Klakity in the alphabet, hah hah.

Angela: Hey, John. I think we've heard enough about your research. Let's talk about your teaching.

John: Oh, okay.

Angela: Would you like to teach multivariable calculus?

John: Sure. I really enjoy that material.

Angela: Oops. Wrong answer, John. Eric has a lock on that course. Nobody teaches it but him.

Dick: Now, Angela, we talked about this. Nobody has a lock on any course.

Eric: Of course, I would be happy to let someone else teach the course. The minute you let me teach probability, Dick.

Dick: That's my course. I created it.

Eric: But I thought no one had a lock on a course.

Dick: It's different if there is only one person competent to teach it.

Angela: Just because you go to Las Vegas doesn't make you a probabilist.

Bob: Okay, gang, we don't want to give our candidate the wrong impression of our happy family. John, this is Bob again, the muckety muck administrator. I'm wondering what kind of supplies you need for your research.

John: You mean computer facilities?

Bob: God, no. I mean pens and pencils, paper clips, pads, and such.

John: Oh, ummmm, I need some of those.

Bob: Which ones?

John: All of them, I think.

Bob: Oh. Well, of course, if you absolutely need all of them, we could put in a request with the Start-Up Committee. But you might want to think about bringing whatever you need from your current institution. They won't miss it. We have a bit of a budget crunch here.

Angela: Bit of a budget crunch? Our department is housed in the basement of the Heating Plant. We haven't had a raise since South America shared a tectonic plate with Africa. The average class size has just past the centennial mark. Yes, we do have a bit of a budget crunch.

Dick: Angela, we are on the phone here. John, let's get back to talking about your teaching. According to your file, you have been quite successful in the classroom. Tell me this. What would you do if a student put you in a half-nelson?

John: What?

Dick: A half-nelson, you know where he has you from behind, with his arm hooked around your right arm and then back up behind your neck.

John: I, ummm, I have never thought about it. I hope I never find myself in that position.

Dick: Well, sure. We all hope that. But what would you do?

John: I would scream for security?

Eric: Oops, another wrong answer. Security doesn't have time to come running every time a faculty member finds himself in a half-nelson. You simply twist to the right, hooking your right leg through his legs. Then grab him at his belt with your left hand, pull hard and voila, he's flat on his back with you on top.

John: Oh. I see. . . .

Dick: John, exactly how much teaching experience do you have?

John: I taught recitation sections throughout my graduate career. Calculus mostly. Then as a postdoc, I taught my own classes for two years.

Bob: Of course, the students you get there are quite different from our students.

John: In what sense?

Bob: They look different. They wear different clothes. They are sometimes shorter and sometimes taller than our students.

John: Umm, yes, but your students are sometimes taller or shorter than the students here.

Bob: Yes, now you seem to be getting it.

John: No, I don't think I am. How do the individual differences in height impact teaching?

Bob: All I am saying, young man, is that you have not taught our students. You have taught some other students. And the techniques that work on those other students may not work on our students.

John: Okay, you mean like your technique of how to get out of a half-nelson might not work as well here, since the student might be of a different height.

Bob: Are you patronizing me?

Dick: Um, John, I'm going to change the subject a bit. As you probably know, we are not allowed to ask you about your marital status.

John: Yes, I am aware of that.

Dick: Yes, so the only way we can find out about it is if you just tell us about it, without us asking.

John: Yes. . . .

Dick: Right, so if you want us to be able to tell you about opportunities for a spouse, or a partner, you would need to fill us in on that spouse or partner, without us asking you for the information.

John: I see. . . .

(Pause)

Angela: I don't think you do, John. Let's try something else. I give you an answer and you give me the corresponding question.

John: What?

Angela: Don't start yet. Wait until I give you the answer.

John: Ummm. . .

Angela: The answer is "I am married."

John: Ummm, the question is, "What is your marital status?"

Dick: That's right. Of course, we never asked it. You asked it.

John: Look, I'm not married, not that it is any of your business.

Dick: Oh, that is interesting unsolicited information.

Eric: Hey, I liked that game. Let's play more.

Angela: Okay. John, here is your next answer. Thirty-two students and a duck.

John: Excuse me?

Angela: I said thirty-two students and a duck.

John: And I'm supposed to come up with a question that has that as an answer?

Angela: Right. Go ahead. You have 15 seconds.

John: This is crazy. I don't know. What does this have to do with the job?

Angela: Time's up. The question was, "What is the enrollment in fluid mechanics?"

Bob: Good God, that's funny, Angela.

John: I don't know what to say.

Dick: No need to say anything. But answer me this. If you were a muppet, which muppet would you be?

John: Are you kidding?

Bob: It's not a hard question.

John: I don't see how this is relevant.

Eric: Just say Kermit. Then we'll believe you have leadership potential.

Angela: Don't give away the answers, Eric.

John: Doesn't anybody want to talk about my qualifications for the job?

Dick: No need, John. I think we have a good sense of what you have to offer. Do you have any questions for us?

John: Well, yes, I have one. Are you actually a pack of loony toons or do you just put on an amazingly accurate portrayal?

Dick: Hmmm, Bob, do you want to field that one?

Bob: My experience is that it's no portrayal. It's real as real can be.

Eric: Ha ha. That's good.

John: I think I am going to hang up now.

Dick: Wait. Don't hang up yet. I want to make you the job offer.

John: What?

Dick: Once in a while, a candidate comes along who impresses us so much, we don't need time to debate. In fact, during this entire conversation, the four of us have been signaling each other with a variety of nonverbal cues, cues that say, "Hire this guy."

Eric: That's right.

Angela: We would love to have you here.

Bob: I have seen some vigorous gesticulations in support of candidates over the years, but none as vigorous as what I have seen here today in support of you.

John: Are you kidding?

Dick: Hardly. And if you come, we'll teach you the secret hand signals. Eric did a shadow thing with his hands where he reenacted the entire scene of you struggling to escape a half-nelson. It was truly hysterical.

Eric: Oh, no. It wasn't any better than most of the other hand signals being flashed around here.

Dick: I will send along an official letter, and then we can get to the negotiations about the paperclips. Nice talking to you, John. You take care, now.

Angela: Bye, John.

Eric: So long.

Bob: We'll be in touch.

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