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Editor-in-chief

Dear X:

*How did I grow to understand mathematics? What a great question! There's the story about a tourist in New York, lost and about to be late to a concert, who stops his car, rolls down the window, and asks a traffic cop, "Hey, officer, how do you get to Carnegie Hall?"*

*The cop shrugs. "Practice, practice, practice."*

*As we said at the beginning of the course – we give you a number of questions to work on. If you need more, the textbook has plenty. If you want more than that, or a different style of answer, Dr. Y and I recommend Schaum's Outline of Calculus, a classic and still cheap after seventy years. Do that work as soon as possible after the lecture, so it sticks with you.*

*That, over four or five courses, will get almost anybody to basic competence – if you actually do it and take it seriously. That's how I did it. What's more, that's how Donald Coxeter did it. That's how Albert Einstein did it. (Stories about his failing high school math are incorrect; they seem to stem from a change in grading scheme around his time from 1-high, 5-low to 5-high, 1-low.) About the only variation from the pattern is that a few high fliers do it on their own rather than waiting for a class – but everybody does the work.*

*The next stage is getting fluent with working with new ideas and proving new things. In reading one math paper, one might need to understand more new ideas than are in your entire calculus course – and during a research project, one might need to read several papers in a day. It's a skill one can learn – with practice. In writing a paper, admittedly a slower process, you might need to invent that many ideas. To learn those skills, you start with single "Prove this" questions, mixed in with the "technique" questions – and keep that up for a dozen or more courses before your BSc, then more in grad school, ending up with a thesis. Practice.*

*Wanting to do it for its own sake, asking questions that nobody's asked before, being prepared to stare at a blank sheet of paper for the twentieth day in a row in the hope of a theorem on the twenty-first – those are things nobody knows how to teach. That gets us to the other old joke, about the amateur musician who begs a virtuoso to listen to him play and tell him if he has any potential. The expert agrees, and at the end of the performance shakes his head. "You don't have the fire." The amateur swallows hard, leaves the room, and goes on to be a successful stockbroker.*

*Years later he meets the musician at a party. "I guess I should thank you for steering me away from music." Rueful grin. "I've had a pretty successful career in investment, though."*

*"I told you you didn't have the fire, right?"*

*"That's it."*

*"That's what I tell everybody who plays for me."*

*"What? You mean I could have been a musician? That's terrible!"*

*"No, my friend. If you'd had the fire, you wouldn't have listened to me."*

*But maybe you do have it, who knows? There's only one way to find out.*

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