

## PROLOGUE

Consider Sim, a Student Interested in Mathematics, who, for whatever reason, placed in remedial arithmetic.

But what she really wants to know is what math is all about. However, she thinks she cannot acquire the knowledge she wants just by memorizing Bourbaki or, for that matter, any other book.

In other words, what she wants is to understand why things mathematical are the way they are and she is not about just to take someone's word for it. Not even Bourbaki's.

Sim wants to be convinced that things mathematical are the way they are because they have to be that way. She wants to be able to reconstitute them whenever she wants to.

And she is going to make real sure this is the way it is going to happen.

But she winds up in Professor Kopeck's class. The professor is asking every student why they are here.

## ACT I

Pr. Kopeck: And how about you Sim?

Sim: I want is to understand why things mathematical are the way they are.

Pr. Kopeck: Pfft! This is as simple as it gets. If, as you say, you already are interested in mathematics. (Turning to the class.) First of all, we have established the girl has an inquiring mind.

Sim: (A bit surprised.) Thank you very much for your noticing I have a mind but I didn't ask you to comment on my mind but only to tell us where we are going to start with.

Pr. Kopeck: (Continuing as if he hadn't noticed.) Second, that Sim is inquisitive specifically of mathematics means she has already given it some thought. Probably a lot of thought. I.e., she clearly already has something on her mind. Therefore the first thing I would do is ask her what she wants to talk about.

Sim: All I know are three things:  
-- I flunked the placement test miserably  
-- I am no dumber than most people  
-- I want to understand what mathematics is all about.

Pr. Kopeck: (He wipes his brow.) Then I would talk about that and the rest follows.

Sim: What follows? We haven't even started!

Pr. Kopeck: However, I emphasize that Sim's is the trivial case.

Sim: (Beginning to get annoyed.) By the same token, could we get started?

Pr. Kopeck: Where was I? Ah yes, because who does not know what to do (if one is inclined to do anything) with a capable and interested student? Practically all the literature and all the discussions are on what to do with students who are unwilling or unable to learn mathematics, but for God knows what reason are being made to study mathematics. Now that is a tough problem (with no known solution, so far). (He wipes his brow.)

Sim: Fair enough. Could you suggest a book?

Pr. Kopeck: As I said, this is as simple as it gets.

Sim: I am glad this is not going to tax you. But, by the same token, could we get started?

## ACT TWO.

Pr. Kopeck: Yes, You have a question. Ask it.

Sim: I don't have no question. I have about a zillion of them.

Pr. Kopeck: We might start another way;

Sim: Good!

Pr. Kopeck: It is entirely up to you.

Sim: Very kind of you, Sir, I am sure.

Pr. Kopeck: The other way is this. Mathematics is narrative about ideas, just like history, philosophy, and literature. I imagine you were following the discussion pretty well, up to a point,

Sim: What's a discussion?

Pr. Kopeck: (Continuing as if he hadn't noticed.) and then the discussion stopped making sense to you. I.e., at some point in your mathematical education---3rd grade? 5th grade? 9th grade?---you no longer could follow the ideas. Where did the discussion stop making sense to you?

Sim: (Something desperate creeping into her voice.) I am telling you: I ain't got no mathematical education. Else, I wouldn't have to ask anyone about mathematics. I could figure it out all by myself. Just by reading. Whatever discussion was going on in first grade, I had no idea what was going on. From day one. up to whatever, like Five, six, seven, eight, nine, then, eleven . . . down to whatever, like Five, four, three, two . . . And I can do it real fast. Which is more than the teacher could do. Used to annoy her no end too. My great aunt had taught me. So, where do we start?

### ACT THREE

Pr. Kopeck: Okay, Miss Sim, tell me again why you want to learn mathematics. Have you encountered mathematics in your life?

Sim: When you go see a movie, do you expect the cashier to ask "why do you want to see this gangster movie? Have you encountered gangsters in your life?"

Pr. Kopeck: (Continuing as if he hadn't noticed.) For example, were you painting a room and could not figure out how much paint to buy?

Sim: Never painted a room in my life.

Pr. Kopeck: Or were you doing some carpentry or plumbing in your house and you could not work out an incline or divide out spacing for stairs or studs?

Sim: (Stage whispering.) I doubt you have done much carpentry: None of my carpenter friends use any mathematics to do that. In fact, one of them tried college, flunked geometry and went back to carpentry where he is now foreman. Still shaking his head about it: How could he be so stupid to waste time and money on a geometry course?

Pr. Kopeck: First, I have built kitchens and bathrooms from the studs out.

Sim: OK, so I was wrong about that. But exactly what mathematics did you use aside from adding mixed numbers?

Pr. Kopeck: Second, it depends upon what you mean by mathematics.

Sim: I keep telling you that I want to learn about mathematics. I don't know any mathematics beyond counting. So why are you asking what I "mean by mathematics"?

Pr. Kopeck: Of course you do not need differential geometry for carpentry,

Sim: What's that? The geometry that makes the difference for carpenters?

Pr. Kopeck: But I have several horror stories of tradesmen with insufficient math.

Sim: Yeah, well I have several horror stories of teachers with insufficient math

Pr. Kopeck: Or was it something a little different? Perhaps you really enjoyed a science class or you were reading a popular science book (many of them are excellent) and you were puzzled by something mathematical?

Sim: I am humoring you but I really do not see in the least that this is leading us anywhere near the starting gate of mathematics. When I have had teachers engaging in this kind of discourse at the end of a class, I have always suspected the worst and I have always been right.

Pr. Kopeck: Perhaps you are a sports fan and you want to make sense of batting averages and on-base percentages? Or were in your kitchen trying and failing to scale up a recipe? Or maybe a relative got into trouble with his credit card and you wanted to help him, but you found you could not make sense of the credit card statement because of things like "annual percentage rate". Maybe you want to be able to make sense of the financial pages of the Wall Street Journal?

Sim: I am struck by your utilitarian vision of mathematics. So, for you, it's just a tool? Music is just muzak to soothe underpaid workers, Etc.

Pr. Kopeck: This is unreal.

Sim: You mean you never had a student who wanted to understand mathematics? That is unreal! What's unreal about me wanting to learn about mathematics without needing it?

Pr. Kopeck: In all of history and for the vast majority of people, mathematics is and has always been "just a tool".

Sim: Well, obviously not for me. So then?

Pr. Kopeck: Without a doubt, this is how most people come to mathematics. Yes, of course, I know people who were enchanted by a number theory puzzle early in life and decided to make mathematics their life's work, but you can count such people on two hands (maybe).

Sim: I don't like puzzles. Are you saying that, other than needing it for some alimentary purpose, there is no other way to "come to

mathematics"?

Pr. Kopeck: Hmmm. A math department's motto might be, "Come for the praxis and stay for the theory." Or, "Come for the praxis and stay for the puzzles."

Sim: You mean it couldn't say, "Come for the beauty and stay for the job you might get out of it." If so, you have a rather limited view of life.

Pr. Kopeck: Even for the ancient Greeks, it was not love of mathematics that drove their investigations. For them, mathematics was either a religion per se, or it was the key to their religions. They worked at mathematics in order to discover the mind of God, not merely to play with numbers.

Sim: I thought that the Greeks had gods and goddesses rather than a single God with a capital G and that, in any case, they were not into playing with numbers but developing geometry on a deductive basis. And there were a few people aside from Pythagoras like Eudoxus and Euclides who certainly were not into religion

Pr. Kopeck: Until fairly recent times (by which I mean circa the sublime Isaac Newton), math was more akin to necromancy than to science as we understand the word. I.e., however impractical we may think necromancy, praxis is what they had on their minds.

Schremmer: Sorry to interrupt but have you read one single line of, say, Pascal, Fermat not to mention Descartes? Or, before them, of the Italian algebraists?

Pr. Kopeck: (Obviously hasn't heard.) As for modern times, I state with no fear of contradiction that the vast majority of people who learn math, learn it as a means to an end.

Sim: And since most people hold that  $1/2 + 1/3 = 2/5$ , one can only suppose that it makes it true just like that law that was passed to the effect that pi was equal to some fraction?

Pr. Kopeck: (Unable to stop.) That end might be anything from carpentry and nursing to plasma physics and civil engineering,

Sim: None of the above are in the majority and the majority does not use mathematics at all. It used to be that mathematics was recommended for price comparison in supermarkets. Even at the time, I never saw anyone doing it.

Pr. Kopeck: (Still unable to stop.) but some non-mathematical goal is what they have in mind.

Sim: That you say so does not make it necessarily true. I could say the contrary with equal lack of fear of contradiction. Or might it be that you think that I am too dumb to relate to mathematics in any way other than "Can you eat it?"

Pr. Kopeck: Can you eat mathematics? If we are to judge by the vast majority of people, that is, indeed, the central question.

Sim: Is it? You have a very poor opinion of the majority. Of course, since you don't belong to said majority, it must make you feel superior.

Pr. Kopeck: Instead, you, Sim, are an enfant sauvage

Schremmer: I must interrupt again. Sim may appear to be very unlike your own students but the probability is nevertheless very high that you have plenty like her who would like to understand mathematics. Over the years I have had many like her. And here is the point: Being no fool, they usually keep their mouth shut until the point, if any, where they feel they can actually speak their mind without looking either ridiculous, idiotic or whatever. From your discourse here, I don't think that it would be very safe for your students to speak their mind. But they do speak their mind when they realize that when proven wrong it is simply because they said something false and that that will be it and that, in particular, there will be no ensuing invasion of privacy, psychological, therapeutic or otherwise.

Pr. Kopeck: (Obviously hasn't heard.) with so little education that you do not even know the meaning of the word "discussion",

Sim: You are the one who missed the point. In some twelve years of school I have never seen anything that came anywhere near a discussion. Our role was just to sing our part in the duet. I am afraid that it is Professor Pipik who does not know what a discussion is: In a discussion, each side has to take what the other side is saying at face value, true or false. If true, you build on it. If false, you so prove. Just like in court. This is not exactly what you, Professor Kopeck, have been doing here.

Pr. Kopeck: (To the gallery.) And she was supposed to have the choice of being tutored by one of us or memorizing Bourbaki.

Schremmer: I must disagree with Sim as Professor Kopeck does not tend so much to miss the point as to twist and evade it. Consider Sim, a Student Interested in Mathematics, who, for whatever reason, placed in remedial arithmetic but really wants to know what math is all about. However, she thinks she cannot acquire the knowledge she wants just by memorizing Bourbaki or, for that matter, any other book.

Pr. Kopeck: (To the gallery.) This is not real life. I would think that I was quite clear.

Sim: Obviously not part of your life. But, you know, there is life outside your universe.

Pr. Kopeck: (To Sim.) What do you like to read?

Sim: Last time anyone asked me that . . . . Ok. Either one of two things: either we can get started in mathematics, or I must respectfully bring this non-exchange to an end.

Pr. Kopeck: What brings [you] to college, in general?

Sim: Is college the only place where one can learn in general and learn mathematics in particular? A rather narrow definition if you ask

me. But then of course you did not.

Pr. Kopeck: Good bye and I wish you luck with someone else. You are very clever but far too unreal for me.

Schremmer: I cannot say that I am exceedingly surprised that Professor Kopeck should refuse to discuss mathematics. Whatever his reasons. But if, for Professor Kopeck to have what seems to be a very precise idea of what he wants his students to be is of course his right, judging from this exchange, it would also seem that, should they dare not to conform to this idea, he will simply have nothing to do with them. And, if so, that would be quite deplorable.