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SPEAKERS

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Welcome. So in this lecture, we're going to talk about writing infinite sets with patterns. And for example, what we're going to look at, like the set of all even integers, or something like this. And this is one of these things where there's kind of like a slick answer, which is a little confusing, but you're going to get used to that kind of notation. But there's also another way to, sometimes you want to write things out just so it's like clear to whomever's reading what you're writing exactly what you mean, like very quickly. Okay, so many, so here's kind of like the underlying question of this particular lecture, is that how do we write the set of all even integers? We want the set of all, but we're not looking at all integers, we're just looking at all even integers. So all even integers. Okay, now there's, so here's kind of the slick answer. And it's good to know how to do this. And once you start getting very comfortable with all these kinds of symbols, you're gonna want to write things often in ways like this, it also kind of is easier to work with. So here's the slick answer. So the integers are precisely everything you get when you multiply all the integers by two, okay. So let's kind of like write this like this. So this is the set, right, this is like this set of all. And then I would write $2\mathbb{Z}$, so this is kind of the form, right, so the set of all, so we have $2\mathbb{Z}$. So that, and then you have x is in the integers. And notice this looks a little different than how some of the ones we've done before, but it still works with this notation. Okay, we're looking at $2\mathbb{Z}$, it's a little funny, we are setting the variable, the variable's at $\mathbb{Z}$, what is $\mathbb{Z}$ allowed to range over, it's going to range over all the integers. So you know, six is two times three, so the $\mathbb{Z}$ would be three or something like this, okay? Um, so this is the set of all. So let's kind of write this out. So this is like the set of all, so this is the set of all and then like the $2\mathbb{Z}$, right, the set of all $2\mathbb{Z}$, satisfying that we have that $\mathbb{Z}$ is an integer. Right? This is kind of what this notation means here.

Okay. So let's kind of look at but this is like the slick answer, but it might be a little difficult to understand. It's useful, but maybe a little difficult to understand. Okay. So here's a much easier to understand example, or way of writing it, okay, is that we could write, so I'm going to put a bunch of dots here, which says I'm going to go infinitely far in that direction. And then I'm going to start going through integers like minus four, minus two, zero, okay. Two, four, maybe also include a six here, who knows, and then I just keep on going like this. Okay, and I put dots to kind of indicate that I keep on going and make sure I make them nice and big to make sure they're very clear to you that there are dots. I think the ones on the other side are a little bit clearer. Okay, so let's kind of break this down. So what did I do there? So breaking it down.

Okay, so what do we have going on there? Um, so we need dots, right to indicate that the pattern continues on forever. Okay, so we need dots to indicate that the pattern continues on forever, indicate that the pattern continues forever. You don't ever stop listening numbers as you go in that direction, but you do have to still fit within that pattern, okay? Um, and then the other part is that we needed to include enough elements, right? So I had to do, and also important here was I had to do dots on both the right hand side and the left hand side, right, to indicate that I'm going to continue infinitely far forward and infinitely far backward. The other thing was I needed to include enough elements to make the pattern clear So I needed to include enough elements to make the pattern clear. Okay, so let's like, so what would be an example of where one might fail at that? Okay, um, is if I had, for example, I just wrote two, and then four and then continued on in the forward direction. Okay? You wouldn't know whether I was talking about positive even integers. So this could be well, I could be talking about the positive even integers, right? Or, what else can I be talking about? Um, I can also be talking about positive powers of two, right?

Right, because this is like two to the one, and then I have two to the two, and then two to the three, and so on, okay. So this is a nice convenient way, if, if you can, right, you can't do this with real numbers. I can't just list them like this. But I could for something like the even integers. And it makes a lot more sense to the, looking at it a lot of the time than something like this, even this is very useful and compact and nice and slick notation. And the kind of key points are, kind of two key points. One was, make sure that you're putting dots to make sure that people continue on to the right and the left when they need to. In this circumstance, notice I put them on the right not on the left, because in this circumstance, we would not continue on the left. Okay, and the other part of it is that you need to include enough elements to make sure that the pattern is actually clear. Like in this example, this could have more than one meaning. Okay, so I think that made some sense. And I'll see you in the next lecture.