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Mon, 11/22 4:36PM 11:17

SUMMARY KEYWORDS

function, discrete, domain, observation, y value, mathematical definition, definition, negative, social sciences, equal, mapping, range, question, graph, called, drawn, statistics, expression, diagram, values

SPEAKERS

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Hi everyone, welcome to our video where we're going to continue to talk about functions. If you look at the explanation in the notes in front of you and to the side of me, you can see a definition for the domain and for the range of a function. These definitions are specifically relating to mathematical equations. So you can see that the domain of an equation is any X value that we can plug into the equation and, and that we can get a real number for Y. So that's very important, we can get a real number for Y. We're gonna look at some expressions later, some practice problems where I'll ask you to find the domain of an expression. Similarly, the range is the set of all possible Y values, or you could think of that like before, like the output, it's the set of all possible Y values that come out of a mathematical equation.

Now today, we're going to focus our attention on functions. And a more mathematical definition of a function, the one we're going to work with in this video, is on the slide in front of you. And it says that a function is a relation or a mapping for which each X maps or find just one Y value. So each X is associated with just one Y value. This is going to have some important implications for using mathematics in social sciences. Looking at the definitions on the slide, the question is asking you to apply that definition and answer the question is G a function. So we've got $G(0) = 0$, we've got $G(4) = \pm 2$, and we've got $G(9) = \pm 3$. Now our definition of a function is that for each X value, there is only or exactly one value from the range. And since $G(4) = \pm 2$, we can see here that G is not a function. If for even just one X value, the function maps to more than one Y value, that mapping cannot be a function. So G is something but it's not a function. And in this video, we're just interested in functions. So we'll just leave it here and say that G is not a function, it does not satisfy our definition of a function.

Next, we're going to look at functions drawn on a diagram. So you can see here that we have a graph of what's called a discrete function K. And there are a number of observations that are identified with this hollow circle here, here and here. So those are our observations, our discrete points, that the function is mapping to from X to Y. Now what is a discrete function? Well, we can see one drawn on the screen. It's one where the domain is countable. So in this case, we've got one, two, three, four.

We've got four different ordered pairs. So we can actually count them. The alternative discrete function is continuous function, we'll look at that later. It turns out with continuous functions, you're not able to count the number of observations in the domain like we just did right here.

Also with discrete functions, many inputs, or in this case X values, have no outputs. Or, in this example, Y values looking at the diagram. So for example, if you wanted to find the function of, say, negative one, there is no observation, or there is no Y value associated with that X value. And so there is no output for F of negative one. And an example of a discrete function in well statistics, or with graphs, is a kind of graph called a scatter plot. And scattered plot graphs are very common in the social sciences, and statistics more broadly. Let's work through this example. We've got a question here. Based on the graph, what is the domain of this discrete function K? So we'll just call this function K. But there's no mathematical definition to go with it. We're just looking at it on this diagram. So what is the domain? Well, say that the domain is we've got an observation here associated with negative four. We've got an observation here, associated with the X value one. And we've got another observation here, three, and our last observation right here. So the X values associated with these points on the discrete function are right here. So that's the set that makes up our domain, our X value can take on any value in that domain, and generate a Y value.

Similarly, what is in the range of this discrete function? So what's the range? Well, our first observation has a Y value of one, So one is in there, we've got negative one, two, and we've got four. And so you can see these are just the Y values associated with each of these observations. What would happen if I add another observation, say, here. Maybe I'll draw it a little bit smaller. Say I add in a fifth observation, well we've already got two in the range, so the range actually wouldn't change, the range would still be these four values. If I add in another two into that range, it doesn't really change the range, right? We would just be having a duplicate two.

We could also add functions. So here we're being asked to add to specific discrete observations. So we're supposed to multiply four by the observation or by the function evaluated, the function K evaluated at X equals one, and we're going to add the function evaluated at negative four. So $4K(1)$ is going to be equal to four times, well K. So there's our one value, we have an observation there, and the Y value is negative one. So I'm going to have a negative one here, plus K evaluated at negative four. So there's our negative four. There's our observation associated with X is equal to negative four, and our, and we're mapping to Y value as one. So I can write $K(-4) = 1$. Rewriting the question itself going to have four times negative one, plus one, and this whole expression is just going to be equal to negative three.