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SPEAKERS

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Here we have a bunch of inputs, and they're being related to or mapped to a bunch of outputs over here. Now what's the math function, that's going to take a two and turn it into a four, take a three, turn it into a six, and take a four and turn it into an eight. If we multiply each of these by two, we're going to turn those inputs into outputs. So if we take two times two, that's going to give us four, we take three and multiply it by two, that's going to give us six. And if we take four, and multiply by two, it's going to give us two, eight. So what's an easier way of writing this down, we could write this as, I'll write it as 2X. So we've got a bunch of two's here. And X is the variable. Where X is a variable, it's very, it's varying, it's changing.

Now we can go a little bit further. So let's take this 2X, and let's put it into a general form. General form of a function. And the general form of a function is to say something like, well, let's let Y be equal to have a function of X. So this is a general form. What do we mean by a general form, this is not specific. If we wrote Y is equal to 2x, that would be a specific function. Now we want to add a little more information about this X. So X is a variable. But it has to come from somewhere. And it has to be one of these inputs over here. So I'm going to change our language from now on, and I'm no longer going to use inputs, I'm going to change inputs to the domain, maybe you saw, maybe this sounds familiar to you, you heard about it in high school, the domain, so we're going to call those series of inputs that the function transforms, we're going to call that the domain. So X is a variable that can take on any value in the domain.

So in our example, X could be 2, X could be 3, and X could be 4. It could be any one of those numbers, but X could not be 5. X can't be 5, it can't be zero, it has to be one of the numbers that's in the domain. Now, what about our outputs, instead of calling them outputs, let's call them the range. So we're going to call these values here, the range. The function maps. What do we use maps for? We use maps to find things. So, the function is going to map each X value in the domain to the Y values in the range. So we often call them a mapping, but you could also call it a relation or even a

correspondence. Although correspondence has a very specific meaning to it, in relation to a function. So the function is what takes us from the domain and the X values and maps them into this Y world here called the range.

Now I wanted to reproduce the question we had before, because I'm not quite done explaining what to do with this, you can see here that we have X is inside the domain, and the domain in set terms can be two, three, and four. So X can take on any value, as long as the value is two, three, or four. And we could go and talk about the range and say that Y can only take on the values four, six, and eight. And as we're going to talk about in a moment, Y depend on or I should say, the Y value depends on the X value. So the X value is determining, is going to through the function, through the function itself is going to determine what the Y value is.

We'll come back to the concept of range and domain in later video, where we actually look at graphs and you can really wrap your head around what the range is and what the domain is. For now, I just want you to have an understanding that a function takes values that are in the domain, and maps them or links them relates them to values that are in the range. Now, take that idea. And let's just talk about language. So if you look at the slide beside me, you'll see that we have a function written in the general form. That's right here. And it's written in the general form, and it just says that Y value, or Y is equal to a function of X. It's just equal to a function of X, we don't know what that function is, we haven't defined it, maybe it's 2X. Maybe it's X squared, maybe it's the square root of X divided by 100. It doesn't really matter. It's written in this general form, and you can think of it kind of like a placeholder.

Now, let's walk through this general form of a function and explain which each part is called and why it's of interest to someone who is studying the social sciences. Now X is known as the independent variable. What do we mean by independence? Well, it can take on any value in the domain, it can take on any allowable value, and it's not conditional. It doesn't matter what else is going on. Similarly, X is also called an exogenous variable. I usually think of X as an independent variable when I'm doing statistics. And then when I'm building models, like in finance, or economics, I think of X as being the exogenous variable. Exo just means out of in Latin. And so it's determined outside of the model. Exo, outside outside the model. Now look at the Y variable, the Y variable is known as the dependent variable. And why do we call it that? Because it's not free, it doesn't have independence, it depends on the value of X. Let's write that down. The independent variable is free. It can take on any value in the domain. The exogenous variable is really just another name for the independent variable so that they're equivalent. And the dependent variable, what does it depend on? It depends on the value of X.

Now, you've heard me say this before. But how do we pronounce this mathematical notation? While we pronounce it as F of X, or FX, also keep in mind this equal sign. So you might have an XY pair, right, and we can call that a pairing. Put curly brackets around it, so you know it's a pairing, or an ordered pair, but I could also just write it like this. The ordered pair could also be written as X F of X. So these two are equivalent, they're the same. To summarize, remember, X can take on any value in the domain, I think that might be the fourth time I've said in this video, X can take on any value in the domain, F of X is the range of F. So once we have X, the function is going to map that X to its Y value.

Take a moment and read the example. So we have this model, that's going to estimate the quality of wine based on air temperature at the vineyard. Now looking at our function, what is the function here? What's the function? Well, the function is V. Or we could write it as V of AT, it's a function of the average air temperature. Which variable is the independent variable? Well, in this case, air temperature is going to be our independent variable, you can think of it like the input. So air temperature determines the quality of wine, the air temperature is causing the quality of the wine to change. The independent variable is a T. What's the dependent variable? Well, the quality of wine depends on the average air temperature. So we're going to have Q. That's our dependent variable. And the value of Q is also equal to this whole thing right here V AT, we've got the equal sign, but I want to emphasize it. Because I often find that students make mistakes, they're not really quite sure what to do with this thing here. If I gave them Q, they know what to do on say a graph.

The last problem showed you how a model or modeling is related to functions. And you learned some important terminology about how to talk about functions and models that you create in social sciences, business, economics. Next, I want to turn our attention to graphs and diagrams. These are very important for communicating ideas in the social sciences. Often you want to summarize data in a way that's meaningful to people. And so it's going to be valuable to to see these functions on graphs and will deepen your understanding or appreciation for what a function is. We also need to look at a more rigorous mathematical definition of a function. Congratulations on making it to the end of the video. And I look forward to seeing you on the next one. Bye for now.