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SPEAKERS

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Hello, everyone, I hope you have two available devices, one for watching this video, and the other upon which you can work through the example with me on Excel. If not, you can watch the video, and then I would suggest that you use a computer, use Excel, use Google Sheets, use another spreadsheet software package of your preference to go ahead and follow along and graph these functions that you can see on the screen in front of you. So I've added these two functions to the side just to help us along so you can remember what we're trying to do. So that said, let's go ahead, let's graph these two functions. And then let's graph the special property that a function and its inverse have.

Alright, let's start with a little housekeeping. I don't know about you, but with my eyesight, the default is a little hard for me to make out. So I'm going to click on this View tab. And when I click on the View tab, I'm going to go to zoom and I'm going to click on the zoom button. And I'm going to change the zoom to, for me, I think, and for us, let's try 125%. So there we zoomed in a little bit. Now here are the two functions that we want to graph. So an interesting feature of Excel is that we often well, we can often use a discrete form of a function and excel will fill in the continuous bits for us. So let me illustrate that we're going to put in some values into this function, and then we're going to graph those functions in a scatter plot. After we graphed the scatter plot, or as we're doing that, we're going to ask the Excel to fill in the spaces between our discrete observations and to make it kind of look continuous. So Excel software, it's going to do that for us. Another thing about Excel is it likes to have things input in a certain order. And if you put it in the right order, it makes your life a lot easier, and the automatic engine that powers Excel will put things in the places that we want them to.

So if we want Excel to understand the data that we're giving it, our first column here, and I'm going to start with a column D, just because we've got these expressions here that I want you to be able to see while we're working. The first column is going to be the X axis values. And our next column E, why don't we put P of Q into our E column, we'll put. And now what have we got here, before I jump too far ahead, I'm actually going to cut these, I'm going to move them down one column, so we're gonna have our X variable here. And we're gonna have a Y variable in the E column. Now we've got some numbers over here. And so my experience tells me that there are a few things that we can do, we want to make kind of the X axis, or in this case anyway, because it's a linear function, I know that

it will be nice to have even spaces between each X variable. So I'm going to put zero here, we could have an equal sign. And I'm going to select the cell D3. right here, and I'm going to add 100 plus 100. So you should be able to see that in the Excel formula area. Hit Enter, so now we've got a zero and 100. And I'm just going to repeat this command. So if you look down here, there's this little black, this little black dot, this little square, I'm going to hold, click on it and drag it all the way down to here. So now we've got an X axis variable that has values zero to 2000. And the space between each one is 100. Now that we've got our X axis variable, which is essentially Q, so maybe we'll add that into the X here, so we've got Q.

We're ready to generate our Y variable. Remember, with Excel, in order for Excel to know that you're doing a calculation, you always start off with an equal sign. So we've got an equal sign there. Next, I'm just going to type in the equation so 2000 minus or this is our Q variable. So Q is in the D column, I'm click, click on that zero, doesn't matter that its zero, we're just interested in that cell, and whatever's in that cell, we're going to divide by two. And dividing it, you know, we can take a zero and divided by a real number, that's no problem, because the answer is just going to be zero. And you can see that we've got 2000 minus zero here, so it's just 2000. But the way that I've written this is I've got a nice little function here. And I'm going to click on the cell that contains that function, I'm going to click specifically on this little square, and the southeast corner of the cell. And I'm going to drag it all the way down. And when I do that, we're going to populate the Y variable values. And you can see that we're starting with 2000. And then we're subtracting half of the X value, or in this case, the Q value, Q, the quantity, and that's going to give us the price of that we're looking for the price of the meal of sushi.

Now, we could just graph this one function. But since the question wants us to graph both the inverse function and the special property, we can keep going. And the way we're going to keep going is we've got our X variable in our D column, every column to the right of that, so E, F, G, and we could keep going, those are going to be additional functions or relations that we're going to be able to add on to the graph. So we're going to be able to add our inverse function and show that special property by generating more Y variables. So we're going to have Y, we can take, we have Y two, Y, Y two here, Y three here, what is our Y two, or our second series, what is our third series? Well, our second series is going to be, I'm going to use this circumflex, this little character right here that I've highlighted on my keyboard, it's shift six. And that typically denotes in math notation that we have a exponent, or a superscript. And so I'm going to have that symbol to denote that this is the inverse function. And then maybe I will also add a Q there, because the inverse function is also a function of Q.

Now we've got our inverse over here, off to the left hand side in the A, B, C column. And I'm going to input that function into Excel. So I've got hit the equal key. And we've got 4000 minus two, and multiplication is the star. So shift eight on my keyboard, little star symbol. And that's going to be multiplied by Q which is also our X axis variable. I hit Enter. Of course, when Q is zero, it's just going to be 4000. But since now I've got this expression here, I can copy it. And so for each cell, as we're going down, we're subtracting two multiplied by this Q from the D column. And it's going to take us all the way down to zero. Well, let's also take a look at the special property. So let's graph the special property. Now, there's a few ways we could go about graphing the special property, I want to do it in a way that illustrates to you that the property is working, and a little something about Excel, and the property itself.

So to do that, I'm going to move my cursor over to cell E3. And you can see here where I've highlighted, I've got our definition of the P of Q function. I'm going to copy that. So let me do it in a way that you can see, I'm going to copy it. And then I'm going to put my cursor in a G3, well, first I'm gonna hit escape, and I'm going to put my cursor at G three, I'm going to right click on the cell. And I'm going to paste into this, it's keep text only but it looks to me like it's actually copied the formula itself. So we've got the formula. That's good. That's what I wanted. Now, we know that if we take the inverse function and plug it into the P of Q function, we're going, we should get the special property, which is going to give us just the Q variable. So I'm going to highlight this D3 cell you can see on Excel that it's a special color that denotes that it's a cell, not just a number or a placeholder. Well, it is a placeholder in some sense. And I'm going to replace the D3 with the inverse function value of that's located at cell F3, and which has the value 4000. So I'm gonna click that in there.

So now you see I've changed the cell from D3 to F3. And that is essentially plugging the inverse function into the P of Q function. If I hit enter, we just see a zero. Now, if I click on that cell, that G3 cell where the zero is, we can see that there's a function here to see if the special property holds, and it's working, and I haven't made a mistake somewhere. I'm going to click on that little square in the bottom right of the cell. And I'm going to drag it all the way down to the bottom of our list down to the last row. And when I release the mouse button, you can see that our special property holds, because we've got zero and zero. So our P value is equal to Q. Here, P is equal to Q, and 1100 is equal to Q. So I think it's working. And I think we're ready to graph this expression using Excel. Now, because I have set up the values in a certain way, so that we start with our X axis variable, which is the quantity Q, and then each corresponding column represents a different Y value for a different function. I'm going to highlight all of the work that we've done. And so if it works properly, Excel will recognize that the D column is the X axis variable. And it will recognize that the names of each function are in the second row.

So I'm going to click on the Insert button, I want to insert a graph. Remember, this is a discrete function. And when we looked at discrete functions, we learned that discrete functions are best graphed with a scatter plot. And that's exactly what we want to do with Excel. So this little button here, with, has like a little graph with little dots on it, that represents a scatter plot. I'm going to click on that. And see it says scatter there. And I've got a whole bunch of different options, they all look a little ugly to me, I could pick the curvy lines. But since these are straight line functions, there's no difference between the curvy lines and the straight lines. So you can take your pick, I'll pick that one. And Excel has created a chart for us, a diagram for us. Now, there's lots of options on here. So looking at this, one thing we might want to do is we notice there's a lot of blank space over here. So I'm going to click on the Y axis, or actually I double clicked on it. And when I did that some options appeared on the right hand side of my screen. And where it says maximum 2500, why don't we, why don't you try replacing that with 2000 and then hit Enter. And that's got rid of that sort of blank space over there on the right. If I move the chart a little bit over to the left, I need a little more room on my screen. There's lots more options that we can play around with.

So you can make the perfect graph for your assignment, the perfect graph for your boss. And you can also learn something about working with mathematics. Now we've got a chart title here, if I click on this plus button, I can add and subtract things, maybe you don't want a title, say you're adding this into an essay to if you want a cleaner look, you can get rid of the gridlines. So there's a very clean

look. If you'd like the gridlines, we can keep the gridlines. But maybe we want to get rid of them. Sometimes you create a graph, and it's obvious what's being illustrated. So you might want to get rid of the legend. In this case, we really want to keep that legend. Notice it's just sort of moved over here to the right side, which might not be something we want. If we don't want it, we can click on this the chart filter on this paintbrush. And Excel has a bunch of different styles of graphs.

So we can change these to look a little bit differently. Notice that there's all kinds of options you can play with some of the mark look quite radical. So we could really change the look at the graph. Maybe we'll leave that there just so you can see how different In some of these are, we can remove different series. So maybe that special property, we don't want to see, what would this look like if we don't have this special property? Well, there it is, we remove the special property, you could put it back and click Apply. And there the special property came back. So you can kind of play around with these things. Lots of different Excel tries to make it very easy for you. To customize the graphs, we could add a title if we wanted. So I clicked on a button there out of the title, we can call this we call it demand for sushi meal, something like that. Or we could just get rid of the title altogether, we showed you before.

One thing that this graph is missing is a label for each of the axes. It's very important certainly when you're a student of economics that you label your graphs properly. To do that, let's click on this plus button right here. And we're going to add axis titles. So clicking if I hover over it, you can see that axis titles have been added to the x axis and y axis, I'm going to click that so that it becomes so now I really don't like to see texts written vertically like that. So I'm going to actually, I'm going to right click it. And I'm going to click Format Axis Title. And you see where I've highlighted to the top right of your screen size and properties. I'm going to give that a left click, and I'm going to go to alignment. And I'm going to change the text direction to horizontal. And now that I've done that, I don't like trying to read things written vertically. So I could type in your call this price, make it really nice, they were going to show this to our boss or professor in a sa course. And they're not really sure what P is maybe we want to give it a nice label like its full name price. And similarly, down here we want quantities. I could leave it centered. But I kind of like it off to the side myself like so. And if you don't like exactly how it looks, you could try and change the chart style. See what happens. So maybe you want to move back to something like that or more basic here, things have moved around that looks kind of nice. I could just sort of oh, let's click that. It's resetting going on. Bring the price back down to a position that I'm comfortable with. And it kind of looks nice having the legend up there. So maybe I'll just leave it like that. And I'm ready. I can add this to a Word document. I could save this as an image. I can add it and then I can easily add it to my essay or my report.