The purpose of this document is to give helpful hints and tricks about how to do formulae and graphing in Excel. These are useful in lots of settings; I’m showing you applications of the methods to look at firm cost functions. All examples and specific details come from Excel on the PC; execution details differ on the Macintosh and on other versions of Excel, but the ideas are the same.

**Formulae**

It will often be the case that you want to see the relationship between two variables. Say you have some function of Y that you want to study. Say you know Y ranges from 0 up to larger numbers, but you think the range of interest to you is probably 0 to 20. The first thing you can do is make a column of numbers with the variable name at the top. Note you can create a column of sequential numbers using the “fill” function by typing the first few numbers, selecting all of them, and then dragging down (in PC’s, you drag from the lower-right corner of the cells). This will extend whatever pattern you’ve started (be it 1, 2, 3… or 10, 20, 30…).
Next, you can make the next column hold numbers calculated from a formula that depends on your Y’s. If you want to refer to a specific element or value of Y, you can simply include the relevant cell letter and number (either by typing them or by clicking on that cell). Typically you will have a column of your function (say, c(Y)) where the c(Y) in each row refers to the Y in the same row.

Here, I implement the formula:

\[ c(Y) = Y^2 - 3Y + 10 \]

And again I’ll drag that down to fill all cells in that column, this time with a formula. Here, filling down causes the cell reference to change from row to row, so if the formula in B2 was 10*A2, the formula in B3 will be 10*A3, and so on.
Now let’s add a few more functions. I want to make a fixed cost column that’s 10 all the way down, and a variable cost column that is $c(Y)$ minus that, and I’ll make some average cost columns as well.
Note that I get a nasty “divided by zero” in the average cost columns for Y=0. That kind of doesn’t matter, but it will make the plot look kind of ugly around zero. Therefore, I want to change Y=0 to Y=0.00001 (or any value near zero). I’ll do that manually just by typing that number in.
Making Plots

Now say I want to plot everything all together. Doing this in modern versions of Excel is really easy. I just select all of the columns. Then I go to the “Insert” menu tab at the top of the screen. In the “Charts” section of the menus at the top, I pull down the “Scatter” option.
For this plot, I’d choose “Scatter with smooth lines”. And this gives me a plot!
Ick. What’s wrong? The problem is simply that the axes are not very helpful—the vertical scale in particular is so zoomed out we can’t see anything, and that’s because Excel automatically scales the axes based on the values being plotted. This will look much nicer if I rescale the axes. How do I do that? I right-click on the vertical axis first, and choose “Format Axis”.
This brings up the following dialog:
Now I’m going to change the Axis Minimum and Maximum to look more sensible.
And voila! Now I have a nice set of graphs.

It is also possible to remove some lines from this graph to make it less cluttered. There are many ways to do this, but one is to right-click on a data series and say “Delete”: 
And then the plot looks much nicer!
Finally, wouldn’t it be nice if the chart were properly labeled? You can do that easily in Excel, too. Make sure the plot is selected, then click on the Chart Tools – Layout tab. Choose the Axis Titles button in the Labels menu block.
Under Primary Horizontal Axis Title, choose Title Below Axis. It will appear as “Axis Title,” so you just need to select that text and replace it with something appropriate, like the variable name and description. Under Primary Vertical Axis Title, you have several options; I usually prefer “Horizontal Title.” Again, a title will appear with text “Axis Title,” and you can replace it with appropriate text.

You can also add a chart title, either in or above the plot area. In the Chart Tools – Layout tab, click Chart Title and choose whether you want it overlayed over the plot area or above the chart.

A final flourish that’s nice: make it so dollar figures show up as such in the graph. Select all of the cost columns and change their format to a dollar format. There are several ways to do this; the easiest is probably to be in the Home tab, and within the Number block click the $ (dollar sign) button. It might give you two places to the right of the decimal that you don’t want; you can get rid of those by, within the same Number block in the Home tab, clicking the “reduce decimal” button (with an arrow and a .0 and a .00).

And voila!
The plot can be selected and copied and pasted into other documents, or printed directly from Excel, or any number of other things.