

Graphing Formulas using Excel 2003

To help you learn how to graph a function in Excel, let's graph the equations $y = -x^2 + 2x - 1$ and $y = x^3 - 3x^2 - 13$ in the window $[-10, 10]$ by $[-25, 10]$.

Create the data for each graph

1. Start Excel. Excel is a spreadsheet program that contains a huge table with many unique capabilities. The table is labeled by column and row with letters and numbers.
2. The cell called A1 is the cell in the column labeled A and the row labeled 1. In that cell type a -10.
3. The cell beneath A1 is labeled as A2 since it is in the A column and second row. In that cell type a -9.

	A	B	C
1	-10		
2	-9		
3			
4			
5			
6			
7			
8			
9			

4. Click on cell A1.
5. Holding the left mouse button down, drag the mouse to cell A2. You should see a heavy black border around the two cells indicating that the cells have been selected.
6. Place your cursor over the fill handle. You'll know it is correctly positioned when the cursor changes to a black cross.

	A	B	C
1	-10		
2	-9		
3			
4			
5			
6			
7			
8			
9			

Fill handle

7. Hold the left mouse button and drag the fill bar down. As you drag the mouse you'll see numbers appear near your mouse. These numbers will be filled in the cells you are dragging across.
8. Once you have dragged to cell A21, release the mouse button. This will fill the cells with numbers from -10 to 10 in increments of 1. These are the x values for the graph's window.

	A	B	C
1	-10		
2	-9		
3			
4			
5			
6			
7			
8			
9			

9. In cell B1 we'll place the corresponding y values for $y = -x^2 + 2x - 1$. To do this, type **=A1^2+2*A1-1**. Make sure you start the formula by typing an =. To refer to cell A1, you can type A1 or click in cell A1.
10. After typing the formula, press **Enter**. Excel will calculate the corresponding y value, 79.

	A	B	C	D
1	-10	=A1^2+2*A1-1		
2	-9			
3	-8			
4	-7			

11. In cell C1 we'll place the y values for $y = x^3 - 3x^2 - 13$. To do this, type **=A1^3-3*A1^2-13**. To refer to cell A1, you can type A1 or click in cell A1.
12. After typing the formula, press **Enter**. Excel will calculate the corresponding y value, -1313.

	A	B	C	D
1	-10	79	=A1^3-3*A1^2-13	
2	-9			
3	-8			
4	-7			

13. Click on cell B1.
14. Drag the mouse to cell C1 while holding down the left mouse button. This will select the cells B1 and C1 as shown to the right.

	A	B	C	D
1	-10	79	-1313	
2	-9			
3	-8			
4	-7			

15. Position your cursor over the fill bar and drag it to cell C21. This will fill columns B and C with the proper y values for the two functions corresponding to the x values in column A.

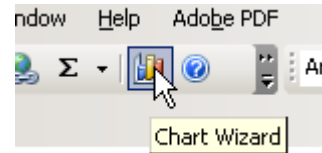
	A	B	C
1	-10	79	-1313
2	-9	62	-985
3	-8	47	-717
4	-7	34	-503
5	-6	23	-337
6	-5	14	-213
7	-4	7	-125
8	-3	2	-67
9	-2	-1	-33
10	-1	-2	-17
11	0	-1	-13
12	1	2	-15
13	2	7	-17
14	3	14	-13
15	4	23	3
16	5	34	37
17	6	47	95
18	7	62	183
19	8	79	307
20	9	98	473
21	10	119	687
22			
23			

Graph the ordered pairs

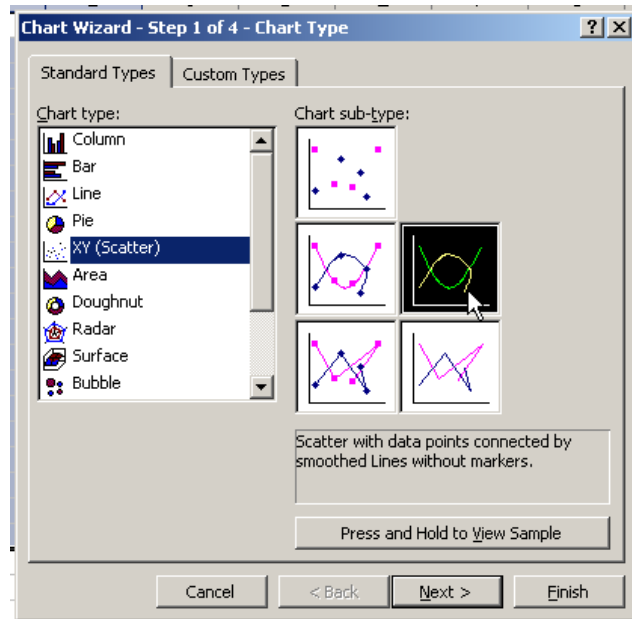
16. Now that you have created the x values and corresponding y values, we need to graph them. We'll do that by first graphing the x values in column A horizontally and the y values from column B for $y = -x^2 + 2x - 1$ vertically. Click in cell A1 and drag the mouse (while holding down the left mouse button) to select the numbers in columns A and B.

	A	B	C	D
1	-10	79	-1313	
2	-9	62	-985	
3	-8	47	-717	
4	-7	34	-503	
5	-6	23	-337	
6	-5	14	-213	
7	-4	7	-125	
8	-3	2	-67	
9	-2	-1	-33	
10	-1	-2	-17	
11	0	-1	-13	
12	1	2	-15	
13	2	7	-17	
14	3	14	-13	
15	4	23	3	
16	5	34	37	
17	6	47	95	
18	7	62	183	
19	8	79	307	
20	9	98	473	
21	10	119	687	
22				
23				

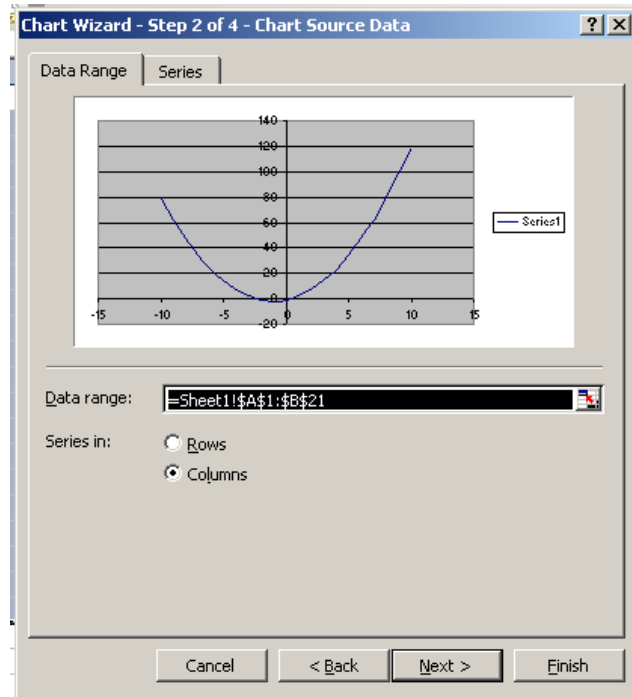
17. Click on the **Chart Wizard** button near the top of the Excel window.



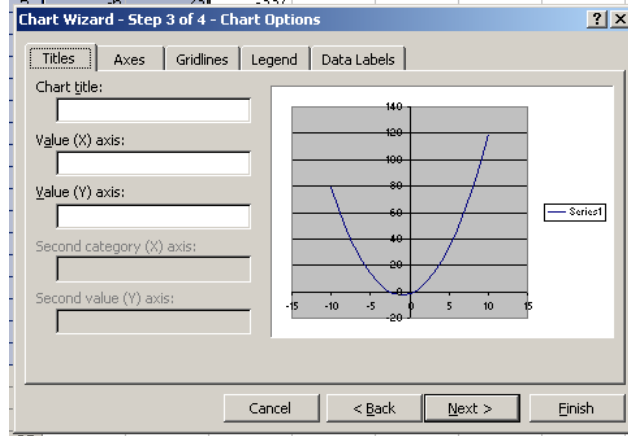
18. From the list of Chart types, select **XY (Scatter)** (**Scatter**).
19. From the Chart sub-types, choose **Scatter with data points connected by smoothed Lines without markers**.
20. Select **Next >**.



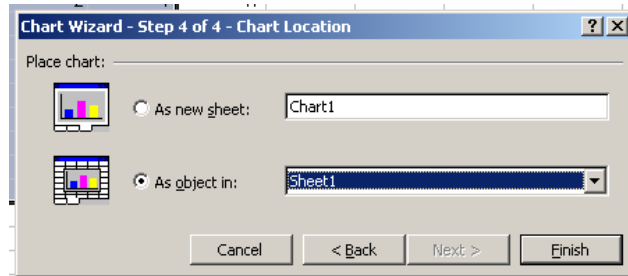
21. Under the Data Range tab, make sure the Data range reads = Sheet1!\$A1:\$B\$21. This means that the data values you are graphing are in cells A1 through B21.
22. Make sure Columns are selected for Series in.
23. Click on **Next >**.



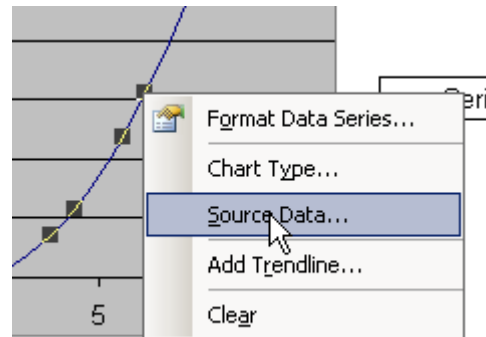
24. There are several tabs you can click on to modify your graph. Since we are creating a basic graph, we won't explore any of these options. Click **Next >** .



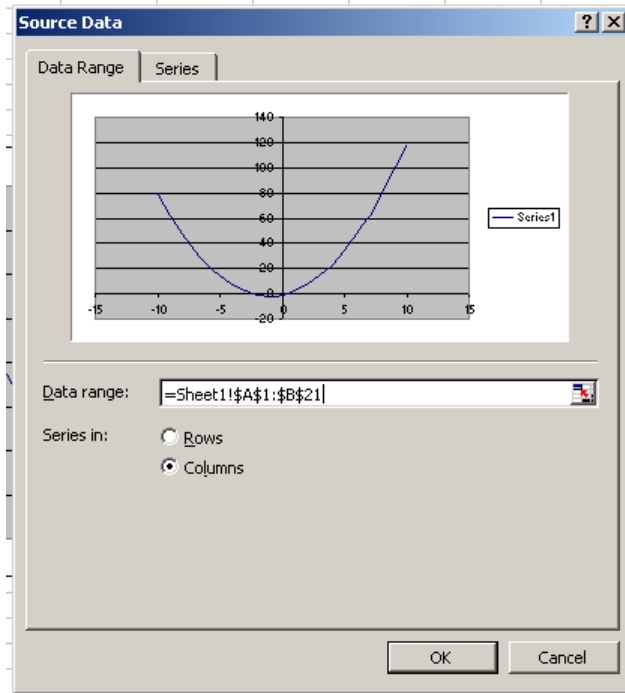
25. This box allows you to specify where you want to put the graph. To put the graph in the worksheet you are working in, select **Finish**. Your graph will be created.



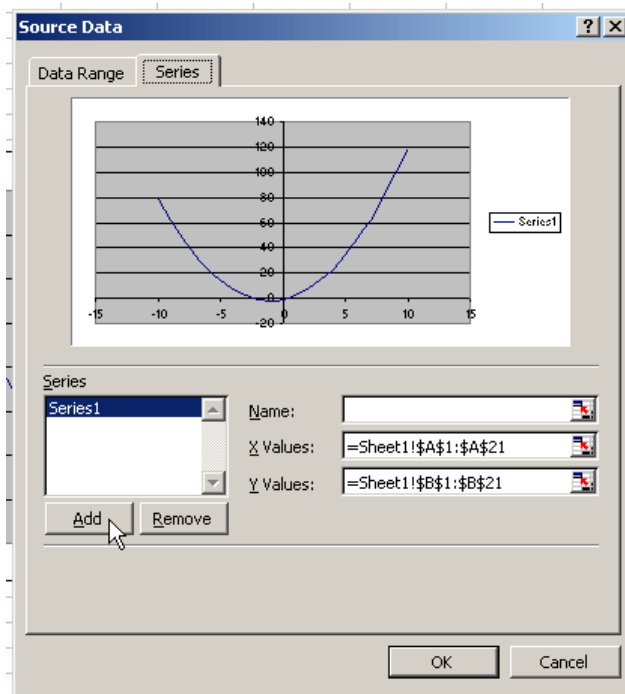
26. To add the third column of data to the graph, right mouse click on the graph.
27. From the list of possibilities displayed, select **Source Data...**



28. A box will appear that indicates what is currently being graphed. To add the new column of data, select the Series tab toward the top of the box.

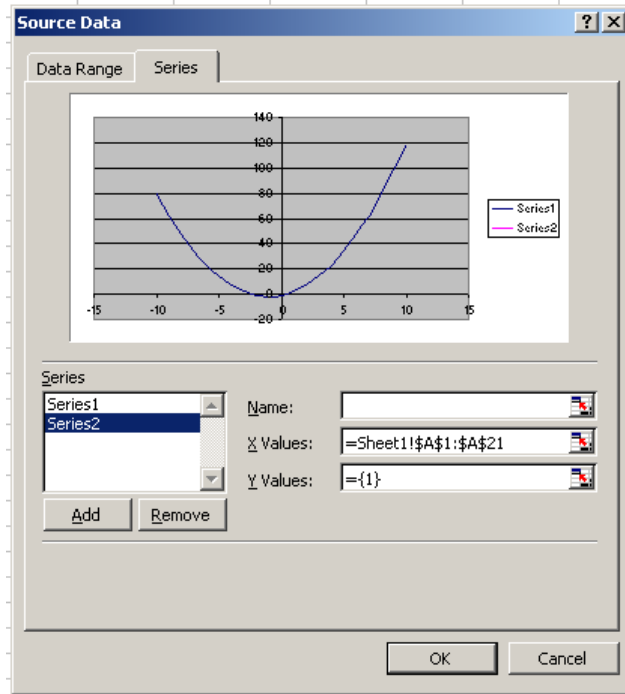


29. This box displays what is currently being graphed. In this case, Series1 is being graphed with the X values coming from cell A1 through A21 and the Y values coming from B1 through B21. To add another series, select **Add**.



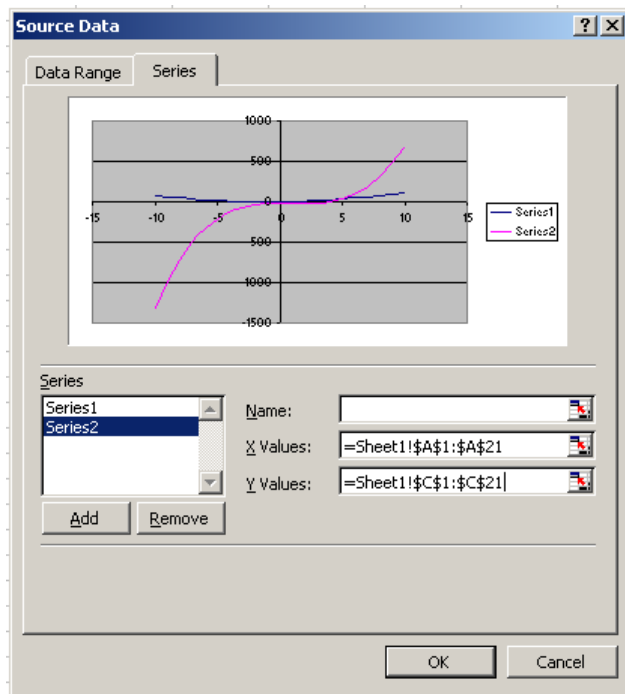
30. Notice that a second series called Series2 is added. For the X Values, the data values are located in =Sheet1!\$A\$1:\$A\$21. This means the data are in cells A1 through A21, exactly what we want.

31. Click in the box next to Y Values. Delete the = {1}.



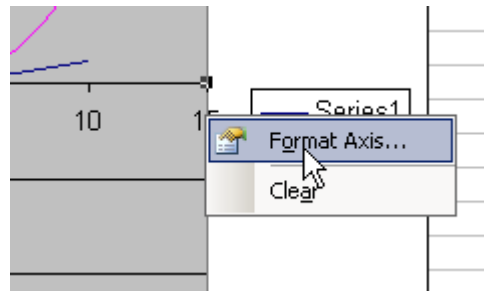
32. To place the proper cells into this box, click on cell C1 and hold your mouse button down to select cells C1 through C21. These locations will be transferred to the Y Values.

33. Click **OK**. The graph will be updated in your worksheet.

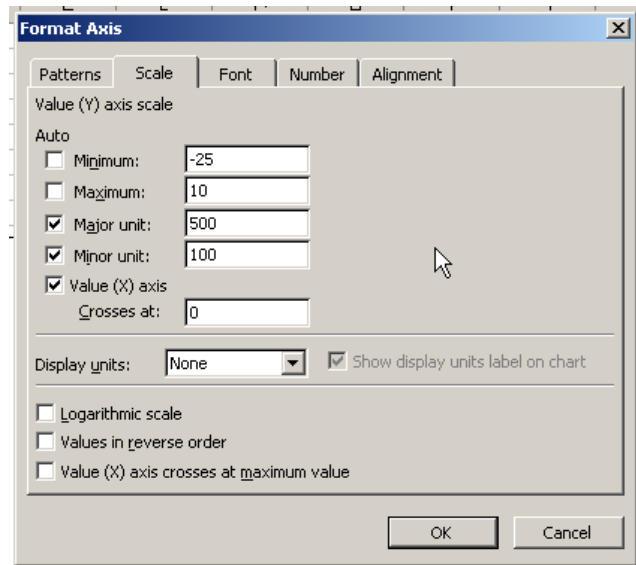


Adjust the graph's window

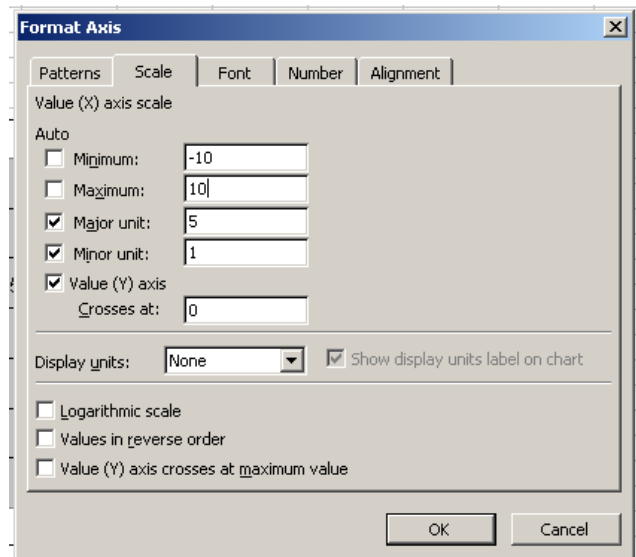
34. To adjust the vertical window to extend from a y value of -25 to 10, right mouse click on one of the numbers labeling the vertical axis.
35. From the choices that appear, select **Format Axis**.



36. Under the Scale tab, uncheck the Auto option next to Minimum and Maximum. Enter a minimum of -25 and a maximum of 10.
37. Click on the **OK** button to change the window.



38. Under the Scale tab, uncheck the Auto option next to Minimum and Maximum. Enter a minimum of -10 and a maximum of 10.
39. Click on the **OK** button to change the window.



40. The graph in your worksheet will include both functions in the window $[-10, 10]$ by $[-25, 10]$.

