Plot Excel Add-In
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Introduction

This document describes an Excel Add-In that allows the user to generate line (i.e. XY Scatter) and surface plots from a formula in a single cell. The generated charts are standard Excel Charts and can be edited, copied and modified as usual.

The general method to construct an XY (Scatter) chart in Excel is to form two columns. In the first column is a list of the independent variable, x, and in the second column is the function, $f(x)$. Then by selecting the two columns and activating the Chart Wizard, you can select XY (Scatter) Chart type and press Finish. This Add-In avoids the generation of the data. Instead you specify a cell that holds the independent variable, x, another cell that calculates $f(x)$, the range that x should vary over and the XY (Scatter) plot is generated. Similarly one can calculate a surface plot (here we have two independent variables: x, y and the function is now $f(x,y)$).

Add-In Installation

To install the Add-In, first save the Plot Add-In on the local machine. For Macintosh, one should save it in Applications/Microsoft Office 2004/Office/Adin-ins folder. For Windows, ideally one should save it in one of two places:

1. Documents and Settings/<user name>/Application Data/Microsoft/AddIns folder
2. Library folder or one of its subfolders in the Microsoft Office/Office folder

These may be invisible folders on your particular machine. Otherwise any place is fine, however once placed it should not be move.
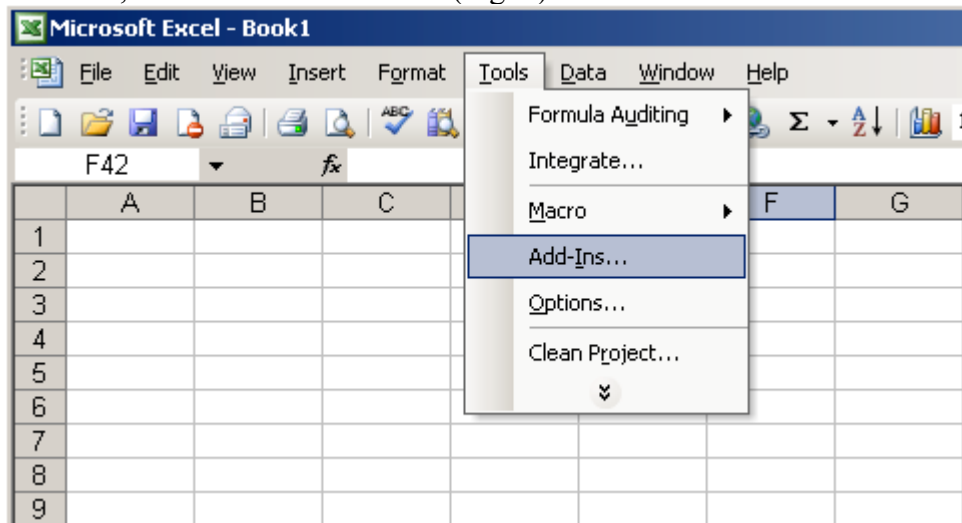
Next start Excel, select Tools>Add-Ins… (Fig. 1).

Fig. 1: Add-Ins… menu

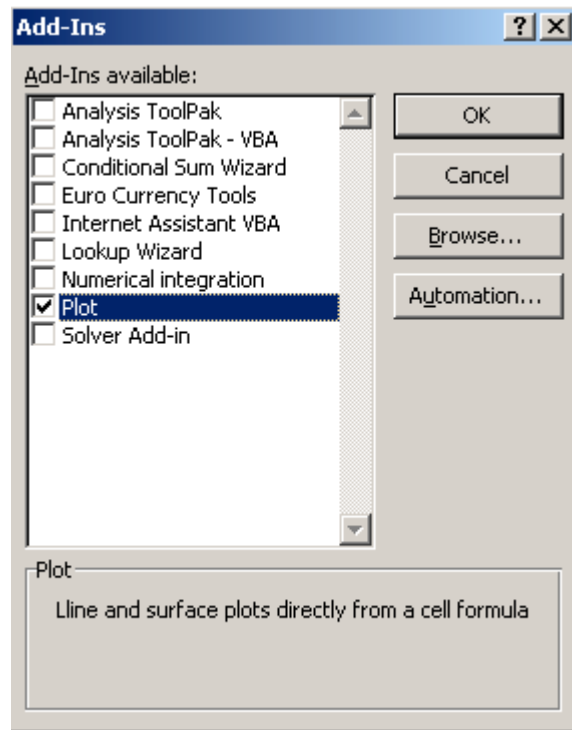This will display the Add-Ins Dialog box, which would look similar to Fig. 2.

Fig. 2: Add-In dialog box

Select *Plot* by checking the box. If *Plot* is not shown, then press the Browse… button and browse to the Plot.xla file you stored locally. Once selected, press OK.

Use
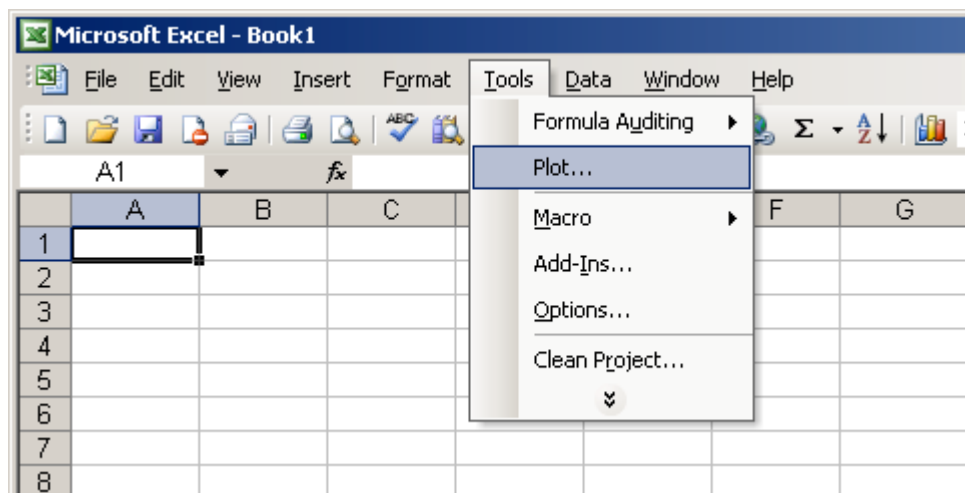By selecting the Tools menu, you now have a new sub-menu named Plot… (Fig. 3).

Fig. 3: New Plot… sub-menu

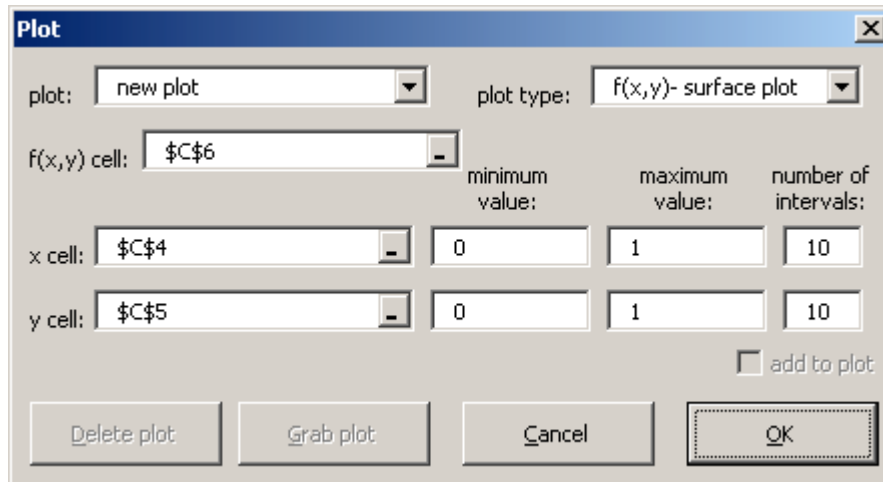Selecting the Plot… sub-menu, you will be presented with the Plot dialog box (Fig 4).

Fig. 4: Plot dialog box

The *plot* pop-up allows you to select either a plot already generated to modify or to create a new plot.

The *plot type* pop-up allows you to select if a line (f(x)- line plot) or a surface (f(x,y)- surface plot) plot.

The *f(x,y) cell* box allows you to select with the mouse a cell that holds the function to be plotted. The selection must be a single cell and must be on the current active sheet. The function must be real valued over the entire plotting region.

The *x cell* box allows you to select with the mouse a cell that holds the first independent variable. The selection must be a single cell and must be on the current active sheet. This cell will not be editable if *add to plot* is checked (see below).

The *y cell* box allows you to select with the mouse a cell that holds the second independent variable. The selection must be a single cell and must be on the current active sheet. This cell will not be editable if *plot type* is 'f(x)- line plot'.

The *minimum value* boxes allow you to type in the minimum range of the independent variables for plotting. The top (bottom) box is for the first (second) independent variable. The top box will not be editable if *add to plot* is checked (see below). The bottom will not be editable if *plot type* is 'f(x)- line plot'. Both boxes must be a real number.

The *maximum value* box allows you to type in the maximum range of the independent variables for plotting. The top (bottom) box is for the first (second) independent variable. The top box will not be editable if *add to plot* is checked (see below). The bottom will not be editable if *plot type* is 'f(x)- line plot'. Both boxes must be a real number.

The *number of intervals* boxes allows you to type in the number of intervals the independent variables will be sampled for plotting. The top (bottom) box is for the first (second) independent variable. The top box will not be editable if *add to plot* is checked

(see below). The bottom will not be editable if *plot type* is 'f(x)- line plot'. Both boxes must be a natural number.

The *add to plot* checkbox allows you to add additional line plot to an existing line plot. In this case, the first independent variable and range are not editable. Additional line plots will appear in a different color and a plot legend will be automatically be generated. This checkbox is only available if *plot type* is 'f(x)- line plot'.

The *Delete plot* button will delete the plot selected in the *plot* pop-up menu. Even if the chart is deleted by hand, the chart will continue to be listed in the *plot* pop-up menu. This button is active only when *plot* pop-up is not 'new plot'.

The *Grab plot…* button allows you to grab the data used for the plot selected in the *plot* pop-up menu. Pressing this button will generate the Chart destination dialog, Fig 4. You then select a cell to paste the data to (any data in the range of the chart will be overwritten). Once OK is pressed, the data will be copied and a new chart whose titled will be appended by "(grabbed)" will be generated. This chart is completely independent of the Plot.xla Add-In. The chart and its data can be edited by the user in the usual way. This button is active only when *plot* pop-up is not 'new plot'.
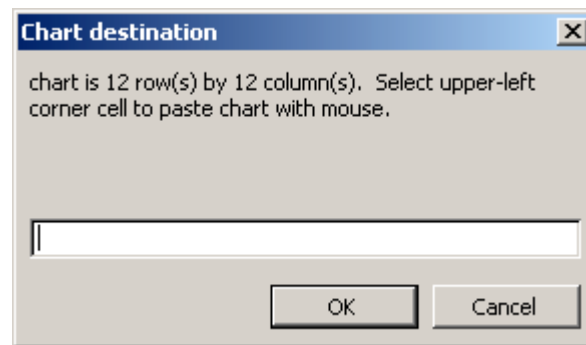

Fig. 4: Chart destination dialog

The *Cancel* button will abort the plotting operation and leave all charts and data untouched.

The *OK* button will generate the specified plot when pressed. Large plots may take time to execute and the progress can be monitored by looking at the Status Bar in Excel (lower left corner).

Example
Load the Plot.xla Add-In and open a new Workbook. On a blank worksheet, reproduce Fig. 5. The labels ("x:", "y:", "r:") in column B are not necessary. The values in column C for x and y can be arbitrary. Select the Plot… sub-menu from the Tools menu and change the Plot dialog box as shown in Fig. 6 (change the range of x & y and the number of intervals). Notice that in this case, default cells for *x cell*, *y cell*, and *f(x,y) cell* were correctly guessed.
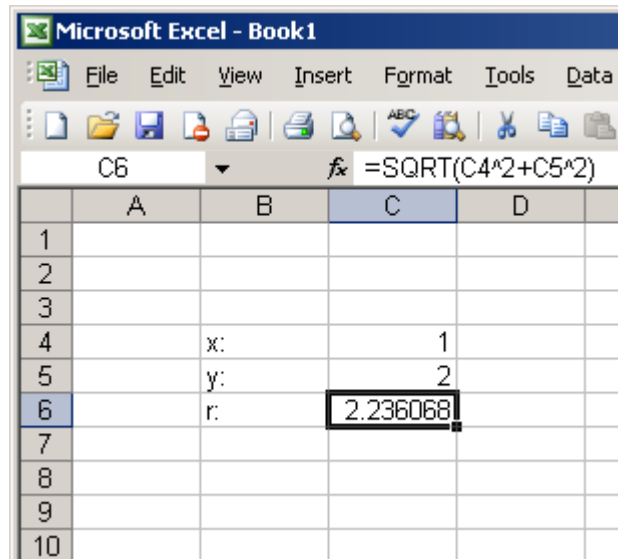
Fig. 5: Example spreadsheet

Fig. 6: Example surface plot dialog

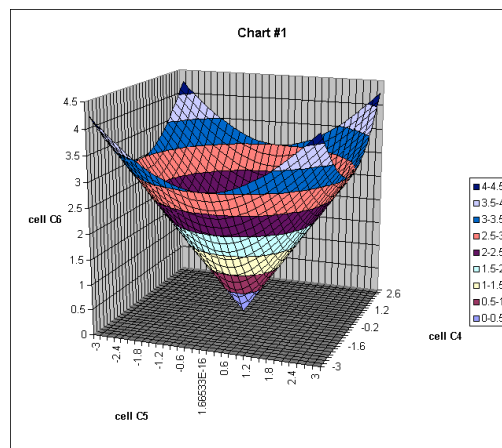Pressing *OK* will generate the following plot, Fig. 7.

Fig. 7: Chart #1

Notice you can select this chart and edit it as an usual Excel Chart. Now, adjust the worksheet by adding in cells B7 and C7, Fig.8.
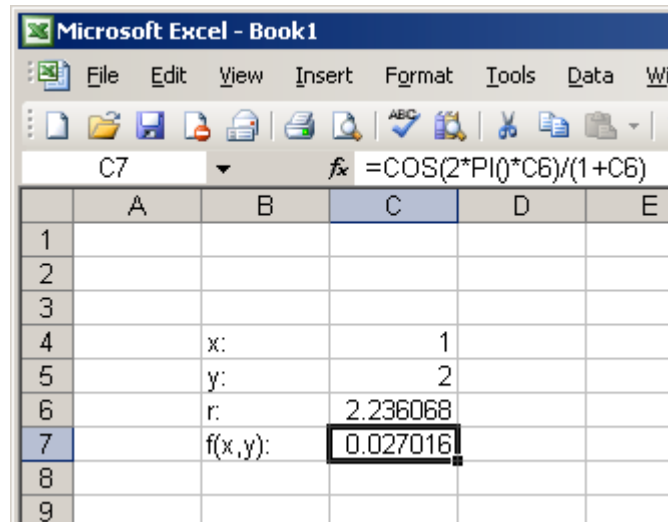

Fig. 8: Adjusted example worksheet

Select Plot… again, change *plot* to 'new plot' and adjust *f(x,y) cell* to point to cell C7, Fig. 9.
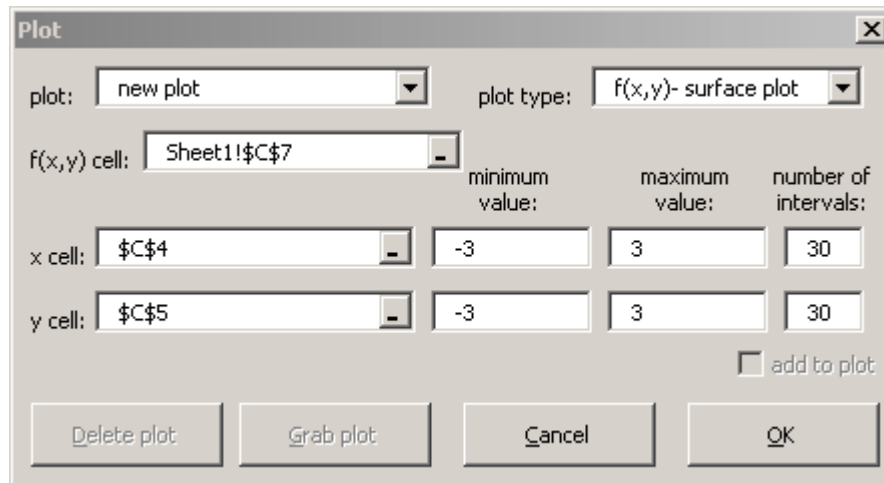

Fig. 9: Adjusted example surface plot dialog

Pressing *OK* will produce Chart #2, Fig. 10. Note if Chart #1 wasn't moved, Chart #2 will completely cover Chart #1. Simply move either one to see both.
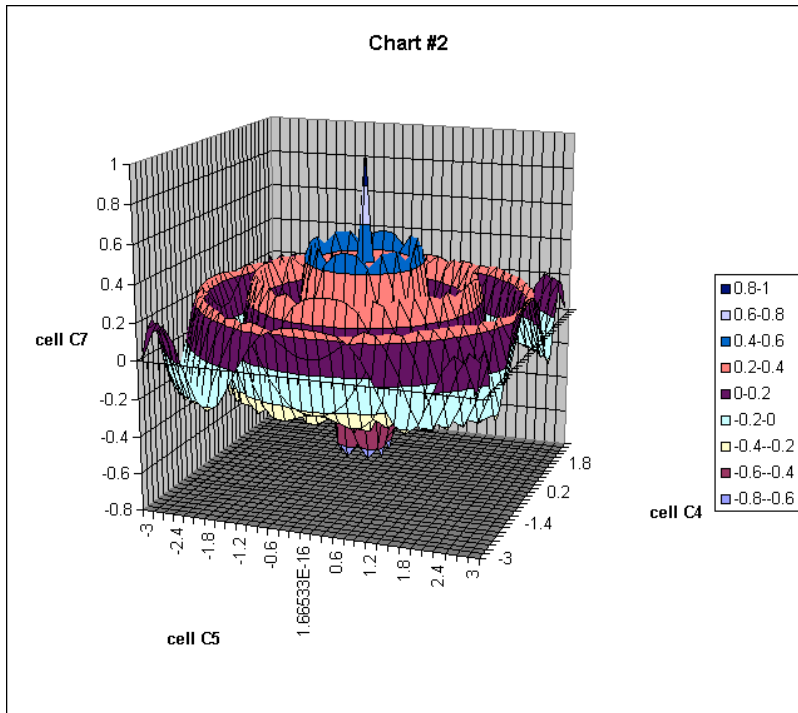
Fig. 10: Plot of cell C7

This shows that the function to be plotted can be a composite function. Select Plot…, chose 'new plot' in the *plot* pop-up and choose 'f(x)- line plot' in the *plot type* pop-up. Pressing OK will generate Chart #3, Fig. 11.
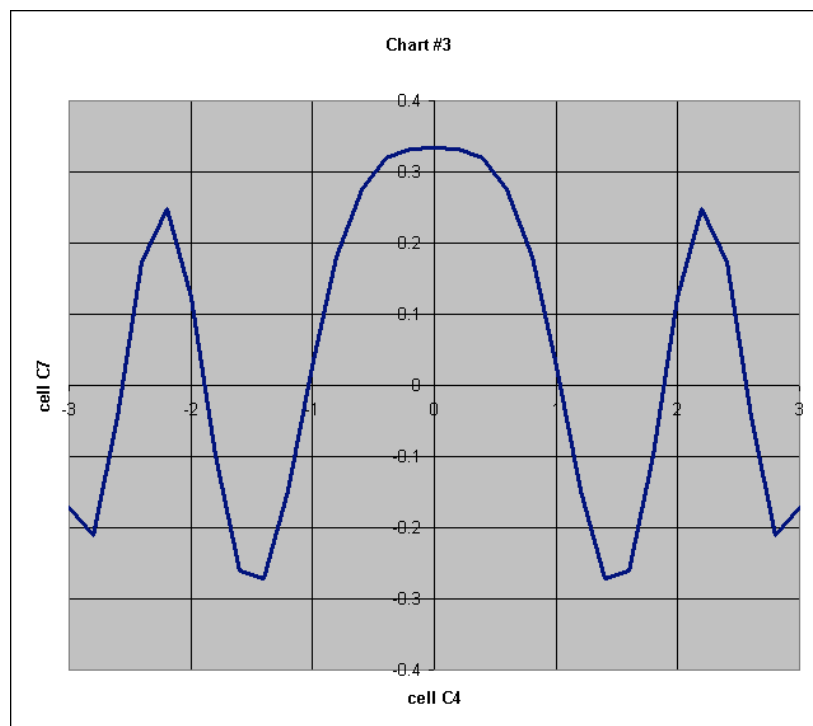

Fig. 11: Line plot

Now change the value in C5 to 0. Select Plot…, check *add to plot* checkbox and press *OK*, you will get the new Chart #3, Fig. 12.
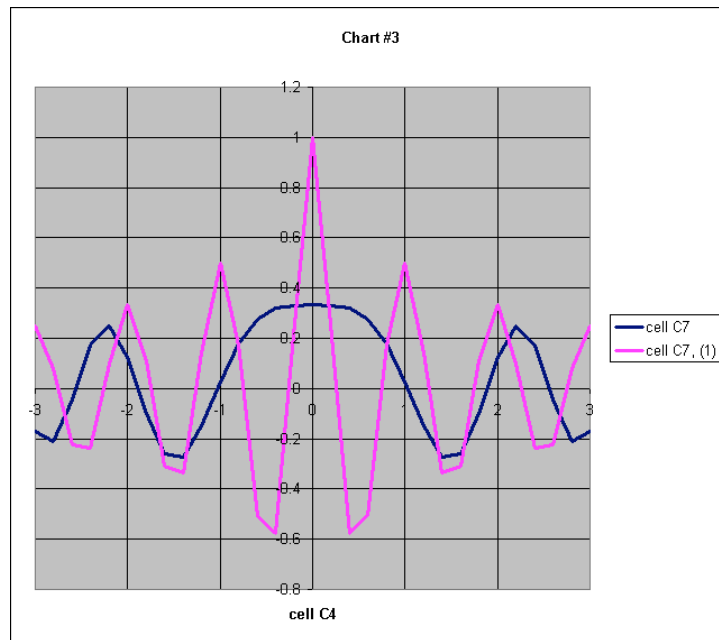

Fig. 12: Multiple line plot

You'll see the original line plot is augmented by a new line plot the modified value of cell C6 and a plot legend was automatically generated. Select Plot… again and change the *f(x,y) cell* to point to cell C6. Pressing *OK* will augment Chart #3 as Fig. 13.
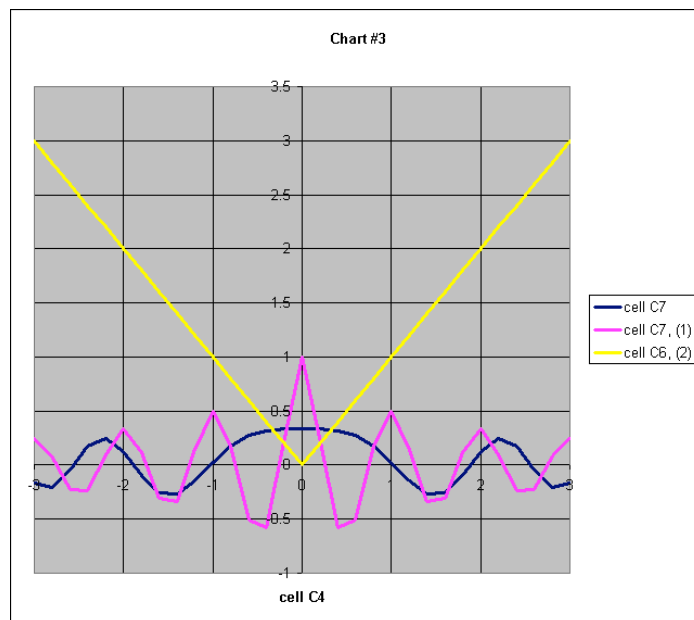

Fig. 13: Augmented Chart #3

This shows that you can have multiple line plots on one chart and while the independent variable and its range and sampling interval are fixed, the function plotted can be different.

Finally, select Plot… again and this time press the *Grab graph…* button. When the Chart destination dialog appears, select cell F2 and press *OK*. The data will be copied to the current worksheet and a new Chart will appear that is identical to Fig. 13 except the title of the Chart will be "Chart #3 (grabbed)". Select Plot… again and press the *Delete* plot button. The original Chart #3 will be deleted and will not be available in *plot* pop-up anymore. Now close this workbook, saving it. Quit Excel. Now reopen the same workbook. You'll find that the first two Charts (Chart #1 and Chart #2) are displaying no plot while "Chart #3 (grabbed)" still shows the correct line plots. If you select Plot… again, you'll see the only option for the *plot* pop-up is 'new plot'. All of the original plots are lost. Only 'grabbed' plots will survive a quit and restart of Excel. If after saving the original workbook and closing and NOT quitting Excel but immediately reopening the saved workbook, you would find that all the charts still had plots, but they would not appear in the *plot* pop-up menu. Regardless, the now defunct plots should be deleted by hand (select the plot and press the delete key).

If one desires to have the plot survive across Excel quits, one must 'grab' the desired plot before closing the worksheet.

Warning/Disclaimer/License
Using this Add-In won't make you more attractive or get you rich. It may even do something horrible to your system, though I definitely hope not. Many people have used this Add-In, including myself, and have had no problems. Basically the worst that can happen is you stumble across a bug and Excel will throw up an error asking if you want to Debug or Cancel. Cancel will get you out and I would suggest you save and quit Excel. I do know nothing in the Add-In itself will hurt your system or Excel, but as you know- garbage in is garbage out.

I wrote this for my personal use. I find it useful, perhaps there's another one who does too. It's free and you can give the distribution (i.e. as you got it) to anyone you want. You can't sell it, though. And if you modify the Add-In and don't give me credit for the original, you're simply evil.

Contact
Like everyone else these days, I have a website at www.parker9.com and the page concerning this program is at www.parker9.com/script.html. Furthermore, email can be sent to Plot@parker9.com.

Version History
- ■ 23 March 2010, v1.0- Original release
- ■ 24 April 2010, v1.0.1- Occasional crash when creating a new plot or when grabbing a plot (need to set chart name only *after* adding data).