Excel for Algebra [1]

Lesson 6: Basic Graphing

Objectives

1. Learn how to construct simple scatter plots from data values.
2. Find trend lines that "fit" the data.
3. Experiment with linear and logarithmic axes.

Overview

Excel provides many different kinds of charts, most of which are not very useful.

One type that is useful -- extremely so – is what Excel calls **XY (Scatter)**. This type of chart corresponds to what algebra books call a "graph", in which ordered pairs of data values (x,y) are plotted against x- and y-axes in a rectangular coordinate system.

Constructing a Scatter Plot

Constructing a scatter plot in Excel is simple, if you proceed as follows.[2]
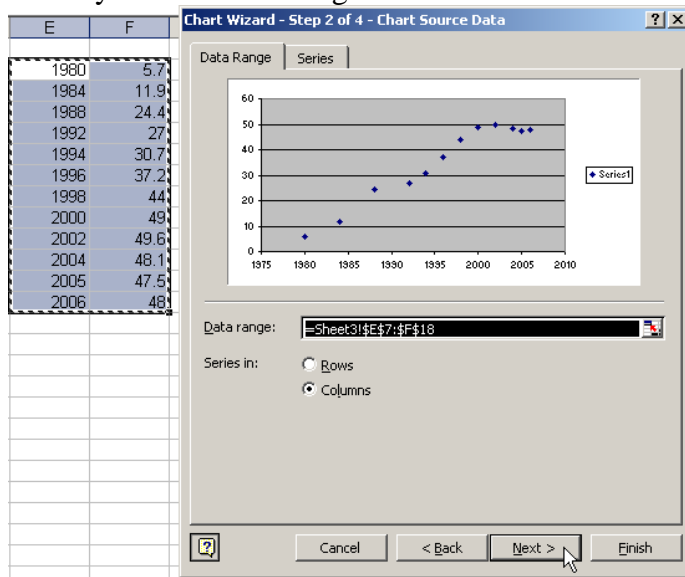
- Organize your data in two columns, with x-values on the left and y-values on the right.
- Select (highlight) both columns of data, then click on the Chart Wizard tool. (If the Chart Wizard button is not visible, use menu Insert > Chart instead.) This will open the Chart Wizard dialog. In the list of chart types, highlight **XY (Scatter)**. Press and hold on the indicated button, to get a quick preview of what your graph will look like.
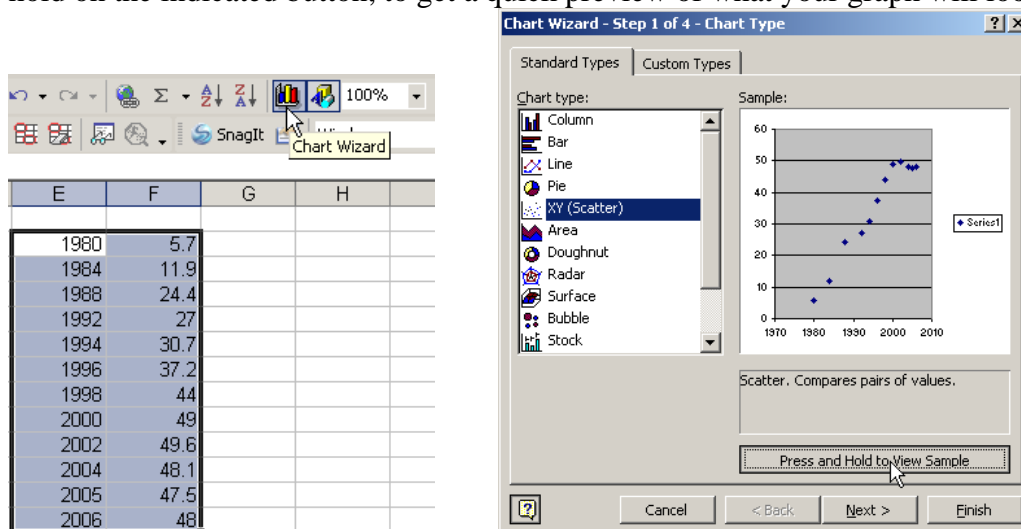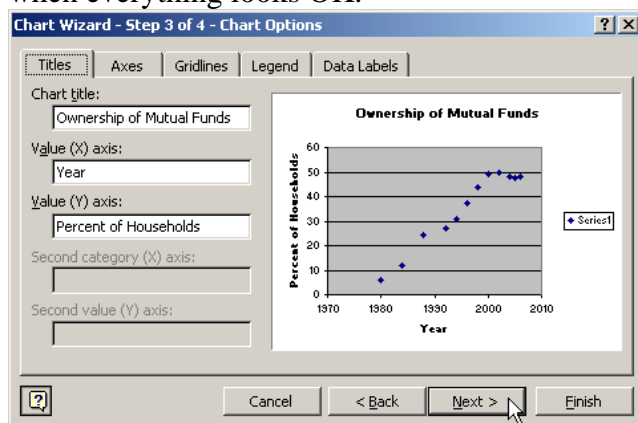

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[2] But be aware that there are lots of ways to go off track, if you do not proceed as follows!
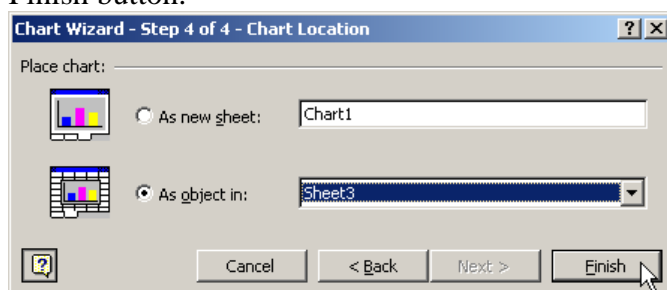
- Assuming that the preview ("sample") looks correct, release the "press and hold" button, and click the Next button. The Chart Wizard dialog will change to show you where your data is coming from. Click the Next button if everything looks OK.

E	F
1980	5.7
1984	11.9
1988	24.4
1992	27
1994	30.7
1996	37.2
1998	44
2000	49
2002	49.6
2004	48.1
2005	47.5
2006	48

Chart Wizard - Step 2 of 4 - Chart Source Data

Data Range | Series

Data range: =Sheet3!$E$7:$F$18

Series in: ○ Rows
             ● Columns

Cancel   < Back   Next >   Finish

- Type titles for the top of your chart and for the x- and y-axes. Click the Next Button when everything looks OK.

Chart Wizard - Step 3 of 4 - Chart Options

Titles | Axes | Gridlines | Legend | Data Labels

Chart title:
Ownership of Mutual Funds

Value (X) axis:
Year

Value (Y) axis:
Percent of Households

Second category (X) axis:

Second value (Y) axis:

Cancel   < Back   Next >   Finish

- Accept the default option to place the chart as an object in the current sheet. Click the Finish button.

Chart Wizard - Step 4 of 4 - Chart Location

Place chart:

○ As new sheet: Chart1

● As object in: Sheet3

Cancel   < Back   Next >   Finish

- Press-and-drag to place the new chart where you can see it conveniently. Resize it as desired by press-and-dragging on any of the little "handle" squares at corners and sides. Then let your mouse cursor "hover" over any data point. You should get a little popup description of that data point. Read the popup, and confirm that it says the same thing your data does!
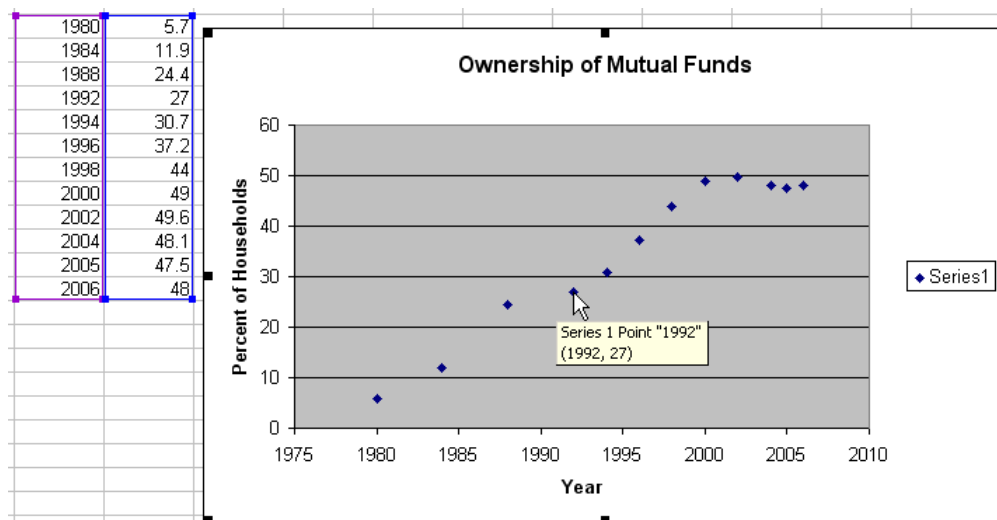
- If all looks OK at this point, then you're ready to move on.

Finding a Trend Line

To have Excel find a "trend line" for you, proceed as follows.

- Select the chart.
- Position your mouse cursor over any point in the graph. Again, you should get a little popup, describing that data point. <u>Right</u>-click to get a context menu, and select "Add Trendline...". (Alternatively, you can left-click to select the data series, then select Chart > Add Trendline..." from the menu system.)
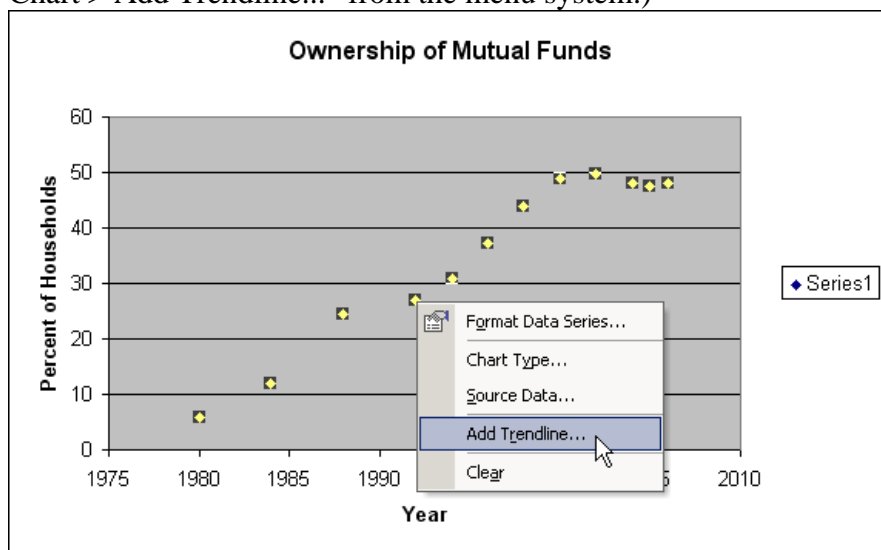
- A new dialog will appear, labeled "Add Trendline".
- Select the type of trend line you want. Linear is a good choice for this example. Click on the Options tab and check the box for "Display equation on chart". Then click OK.
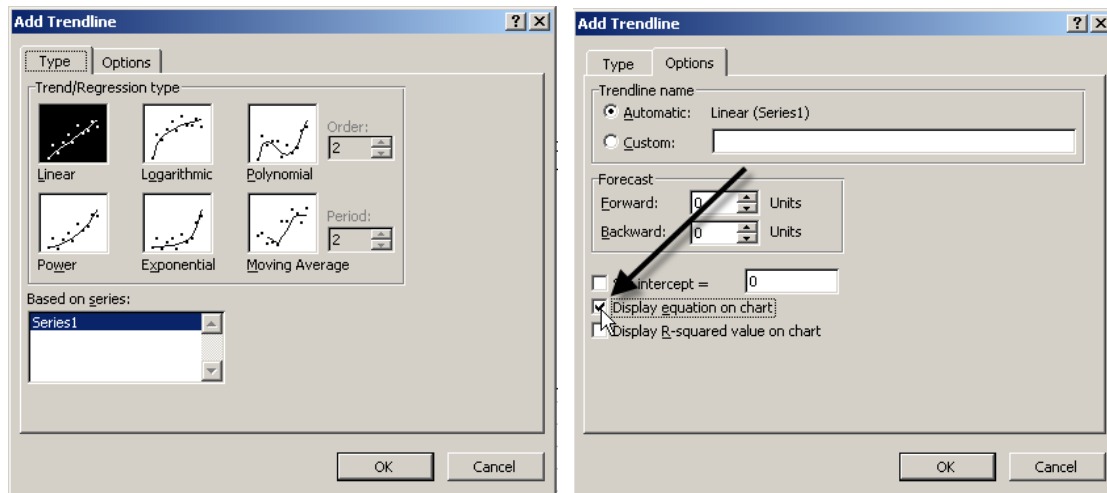
- A trendline will now appear on the chart. Notice that the trendline is fitted to <u>all</u> of the data points in the series.
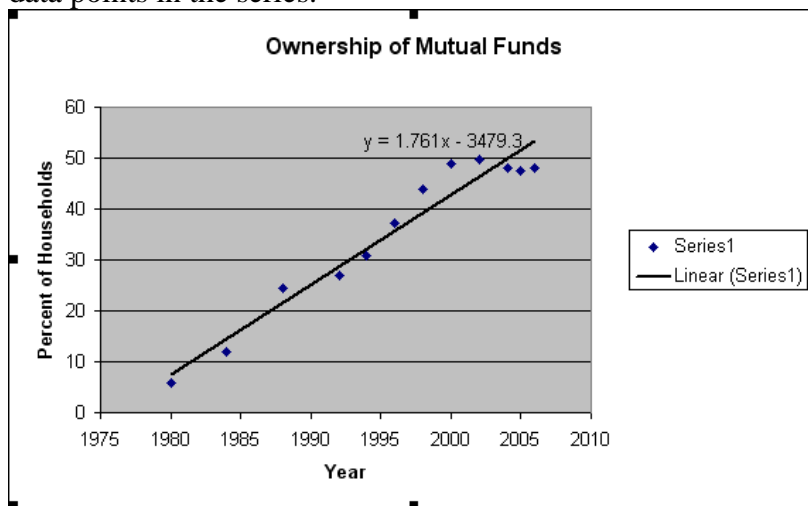

If you want to fit a trendline to only some of your data points, the easiest approach is to construct a new graph containing just those data, and fit a trendline in that new graph.

Linear vs Logarithmic Axes

By default, Excel scatter plots are always constructed with linear axes. For some types of data, logarithmic axes are more appropriate.

For example, here is a graph of the value of a (hypothetical, inflation-adjusted) stock market investment covering a roughly 75-year period. Because financial indicators usually grow exponentially, plotting values on a linear y-axis causes most of the information to be scrunched down against the x-axis.

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1984	41.23022
1985	42.29668
1986	54.0033
1987	63.63236
1988	64.59462
1989	72.13319
1990	91.14231
1991	83.07617
1992	105.1767
1993	110.4674
1994	118.7539
1995	117.8718
1996	157.9004
1997	185.7074
1998	244.1386
1999	310.9628
2000	368.3125
2001	323.9126
2002	277.5017
2003	212.8093
2004	267.762
2005	289.1933
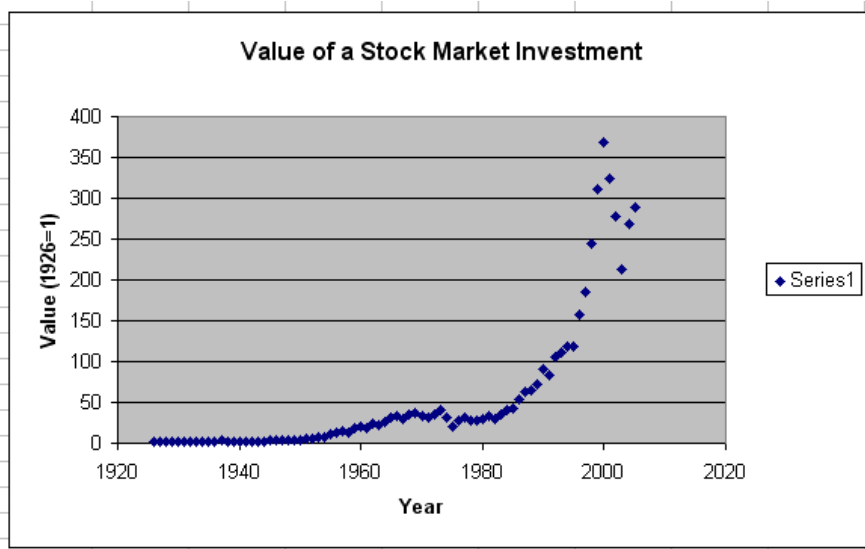
To fix this problem, change the y-axis to be logarithmic, by proceeding as follows.

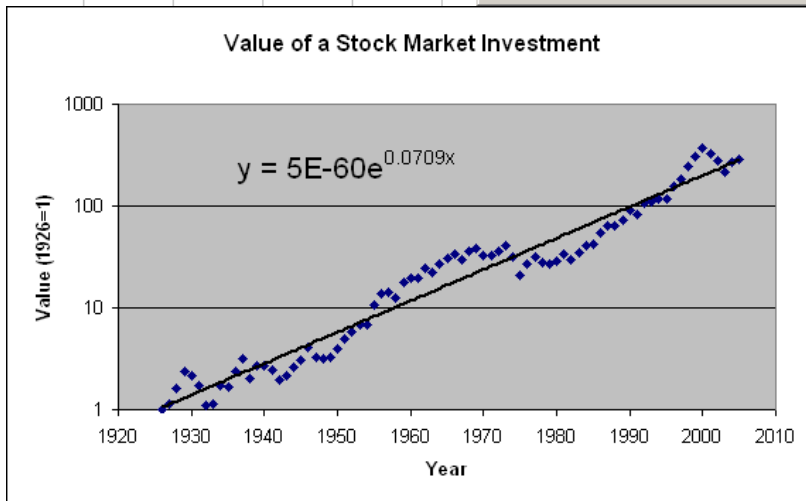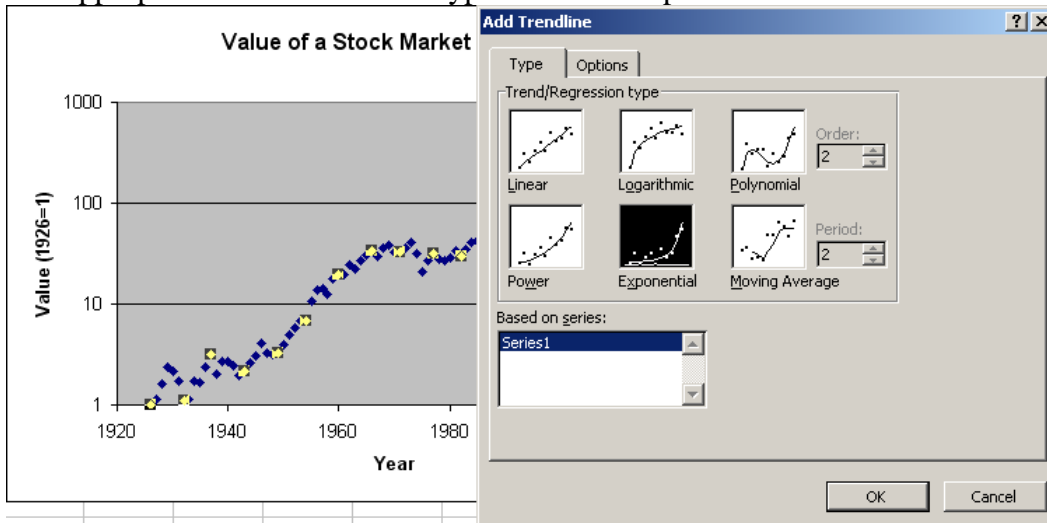- Select the graph, hover over the y-axis, then right-click and select "Format Axis..."
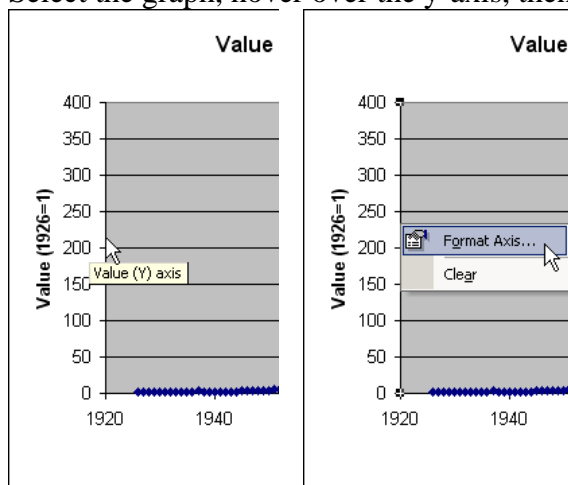
- A "Format Axis" dialog will appear. Put a checkmark in the "Logarithmic scale" box. Then click OK.

- The graph will be redrawn to use a logarithmic y-axis.
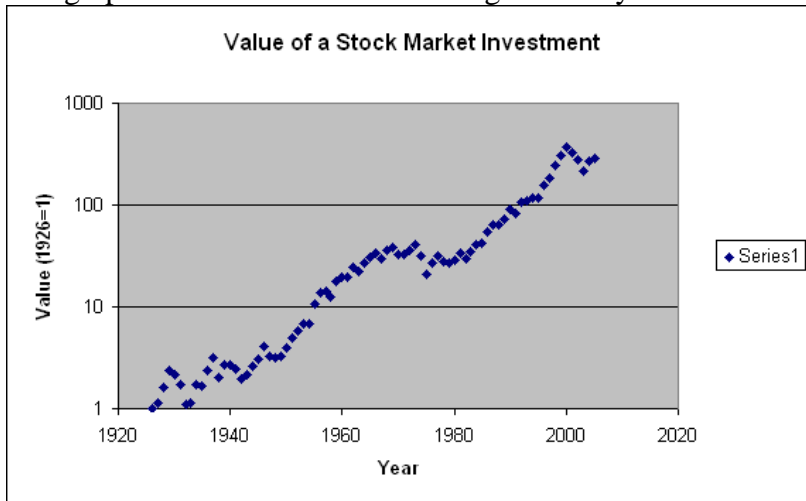
- The appropriate trendline for this type of data is Exponential.

As you can see, the exponential model fits this data quite well. The growth rate is a factor of $e^{0.0709}$ per year. Evaluating the Excel formula =EXP(0.0709) indicates that this value is about 1.073, or about 7.3% growth per year over the long term.