

# Excel Plots: Formatting and Multiple Curves

**Problem Statement:** While our 2007 engineering graduate is earning 5% annual raises, inflation is also doing well, averaging 4% per year. Adjusting for inflation, calculate our engineer's actual purchasing power in 2007 dollars for the first 25 years of work. Then, plot BOTH the engineer's actual salary earnings and the corresponding purchasing power in 2007 dollars for the first 25 years ON THE SAME PLOT.

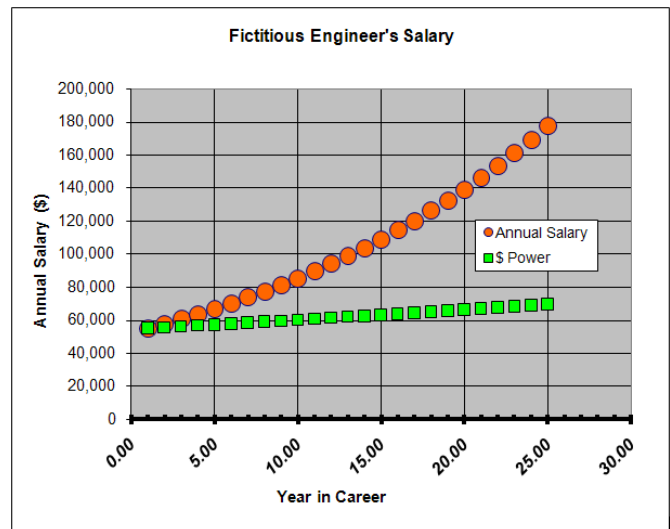
The annual salary equation can be written as

$$\text{salary} = \text{starting salary} \cdot \left(1 + \frac{\% \text{ raise}}{100\%}\right)^{\text{year}-1}$$

Adjusting for inflation, the purchasing power equation can be written as

$$\text{power} = \text{starting salary} \cdot \left(1 + \frac{\% \text{ raise} - \% \text{ inflation}}{100\%}\right)^{\text{year}-1}$$

Salary \$	Year	Initial Salary \$	Annual Raise %	Inflation %	\$ Power
55,000	1	55,000	5	4	55,000
57,750	2				55,550
60,638	3				56,106
63,669	4				56,667
66,853	5				57,233
70,195	6				57,806
73,705	7				58,384
77,391	8				58,967
81,260	9				59,557
85,323	10				60,153
89,589	11				60,754
94,069	12				61,362
98,772	13				61,975
103,711	14				62,595
108,896	15				63,221
114,341	16				63,853
120,058	17				64,492
126,061	18				65,137
132,364	19				65,788
138,982	20				66,446
145,931	21				67,110
153,228	22				67,782
160,889	23				68,459
168,934	24				69,144
177,380	25				69,835



## Excel Skills to Cover:

1. Resizing plots
2. Format axis
3. Format data series
4. Select data to add another series
5. General rule for plots (always have axis labels with units)

# Excel: Built-in Functions

**Problem Statement:** Using the built-in functions in Microsoft Excel, calculate the sine of angles between 0 and 90 degrees, inclusive, using increments of 15 degrees. Do the same for the cosine of these angles. Please format the sine and cosine values to exactly 4 decimal places.

Angle (degrees)	Sine *	Sine	Cosine
0	0	0.0000	1.0000
15	0.650288	0.2588	0.9659
30	-0.98803	0.5000	0.8660
45	0.850904	0.7071	0.7071
60	-0.30481	0.8660	0.5000
75	-0.38778	0.9659	0.2588
90	0.893997	1.0000	0.0000

\* These values are incorrect since you must convert the angles to radians.

## Excel Skills to Cover:

1. Sine function
2. Radians versus degrees
3. Radians function
4. Cosine function
5. Adding borders to cells and other ways to “dress up” a table

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**Problem Statement:** Use the built-in “average” function in Microsoft Excel to calculate the average of the integers between 1 and 10 inclusive.

- 1
- 2
- 3
- 4
- 5
- 6
- 7
- 8
- 9
- 10

## Excel Skills:

1. An easy way to make a series of numbers is to type the 1<sup>st</sup> couple of numbers and then select them and pull down the lower right handle – you should then see the series.
2. Average function

# Boe-Bot Whisker Circuit

Hook up the whiskers and run the following program:

```
' {$STAMP BS2}
' {$PBASIC 2.5}
DO
  DEBUG CRSRXY, 0, 3,
    "p5 = ", BIN1 IN5,
    "      p7 = ", BIN1 IN7
LOOP
```



A pin can be an input or an output. For the whisker circuit, pins 5 and 7 are input pins. Hook a multimeter to the monitor the status of the whiskers. Does the multimeter reading change when the whisker is pressed, and is this change reflected in the output of the program above? The whisker circuit is shown below.

