Nuclear Graphing 101
Since several people have asked:

How to make the graphs?
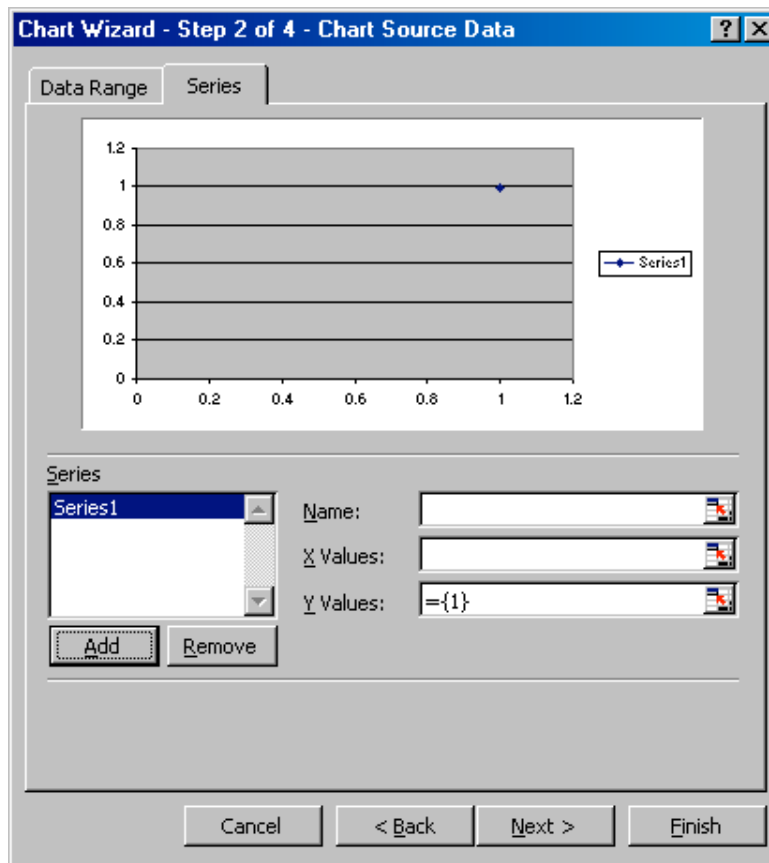

	time (min)	cts/min	ln cts/min
	2	27543	10.2235
	3	25400	10.1425
	4	23262	10.05458
	5	21177	9.960671
	6	19460	9.876116
	7	17781	9.785886
	8	16293	9.698491
	9	14996	9.615539
	10	13542	9.513551
	11	12581	9.439943
	12	11439	9.344784
	13	10424	9.251866
	14	9437	9.152393
	15	8760	9.077951
	16	7815	8.9638
	17	7243	8.887791
	18	6647	8.801921
	19	6152	8.724533
	20	5647	8.63888
	21	5159	8.548498
	22	4561	8.425297
	23	4222	8.348064
	24	3848	8.255309
	25	3629	8.196712
	26	3163	8.059276
	27	2960	7.992945
	28	2711	7.905073
	29	2435	7.797702
	30	2298	7.739794
	31	2074	7.637234
	32	1905	7.552237

1. Choose the chart Wizard Button or under the pull down menu for "Insert" choose "chart".
Choose XY (Scatter) plot.
(***Note:*** *The Line plots for some reason do not calculate the values for the trendlines accurately.*)

Hit Next

Chart Wizard - Step 2 of 4 - Chart Source Data

Data Range | Series

To create a chart, click in the Data range box. Then, on the worksheet, select the cells that contain the data and labels you want in the chart.

Data range: [   ]

Series in: ○ Rows
              ○ Columns

Cancel | < Back | Next > | Finish
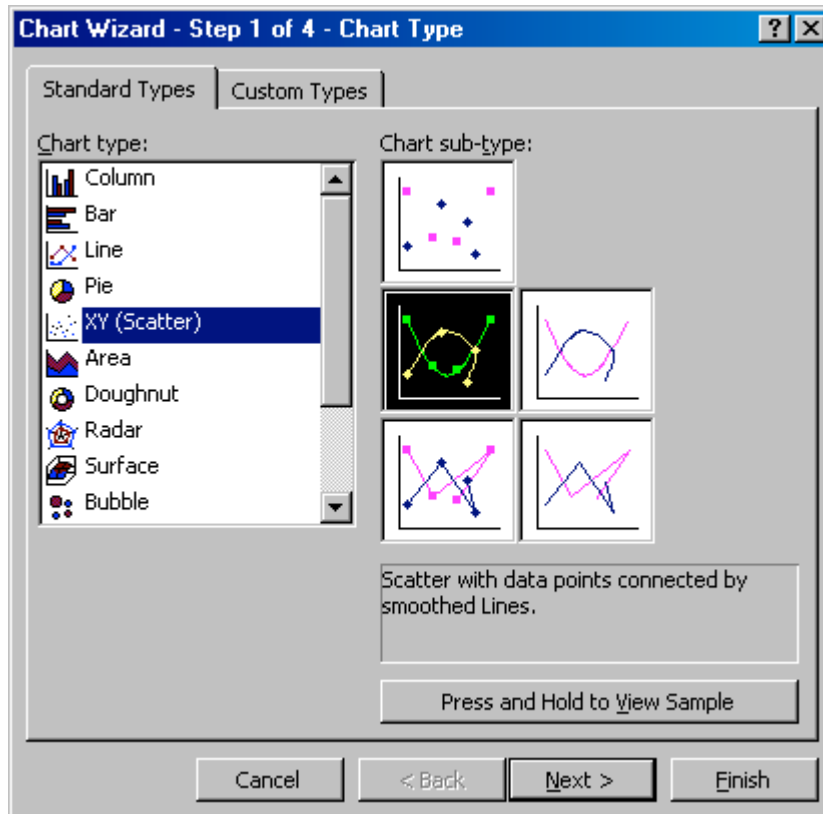
Choose the tab labeled "Series". Then Add. It will add "Series 1".

Chart Wizard - Step 2 of 4 - Chart Source Data

Data Range | Series

Series
Series1

Name: [   ]
X Values: [   ]
Y Values: [={1}   ]

Add | Remove

Cancel | < Back | Next > | Finish

Click on the red arrow to the right of the "X Values" box. This will take you back to your data.
Choose the "time" in minutes. Then hit the red arrow again and it will take you back to your series
box.

Click on the red arrow to the right of the "Y Values" box. This will take you back to your data.
Choose the "counts per minute". Then hit the red arrow again and it will take you back to your
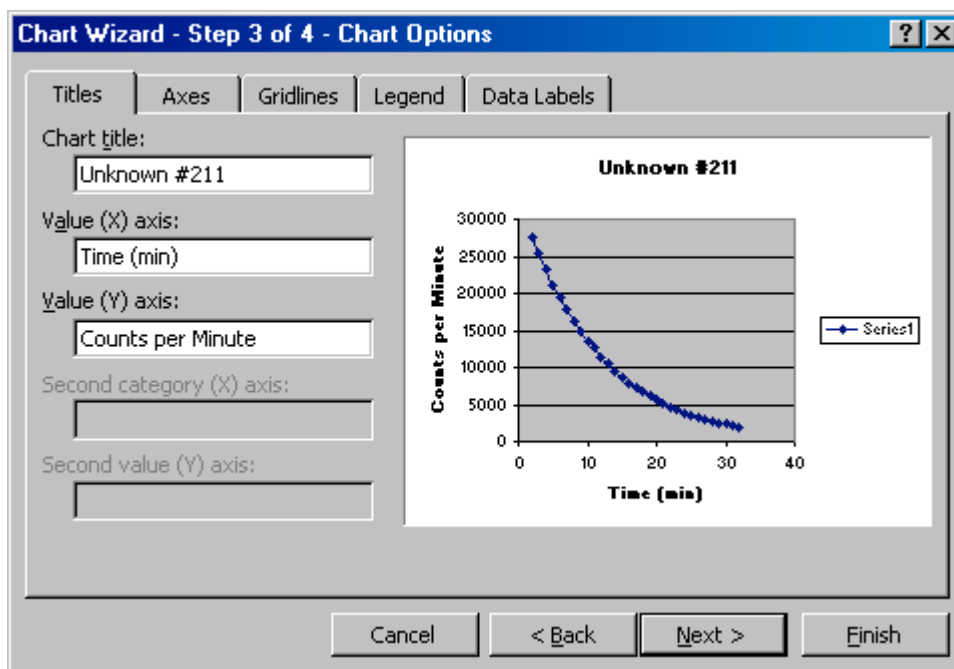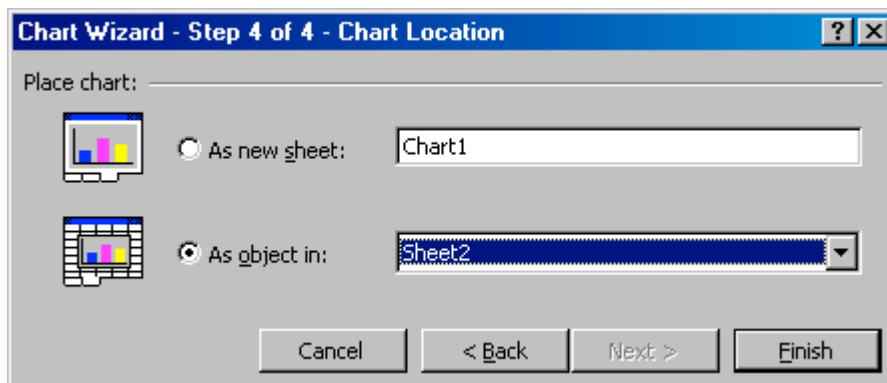series box.

Next.
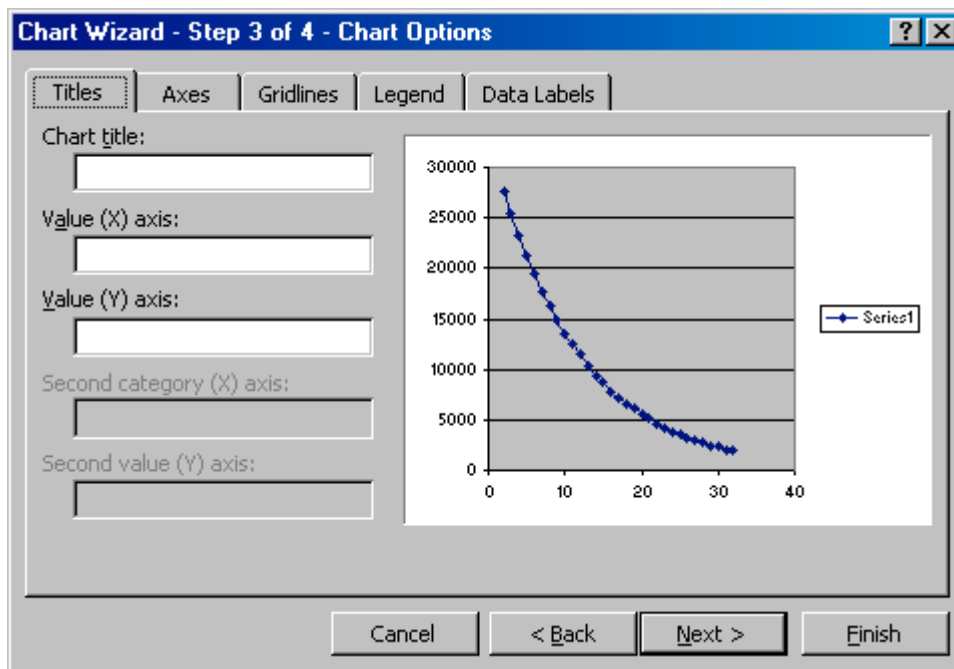
Your **Chart Title** should be your unknown number or "Reactor Data".
 Your x values are time (minutes).
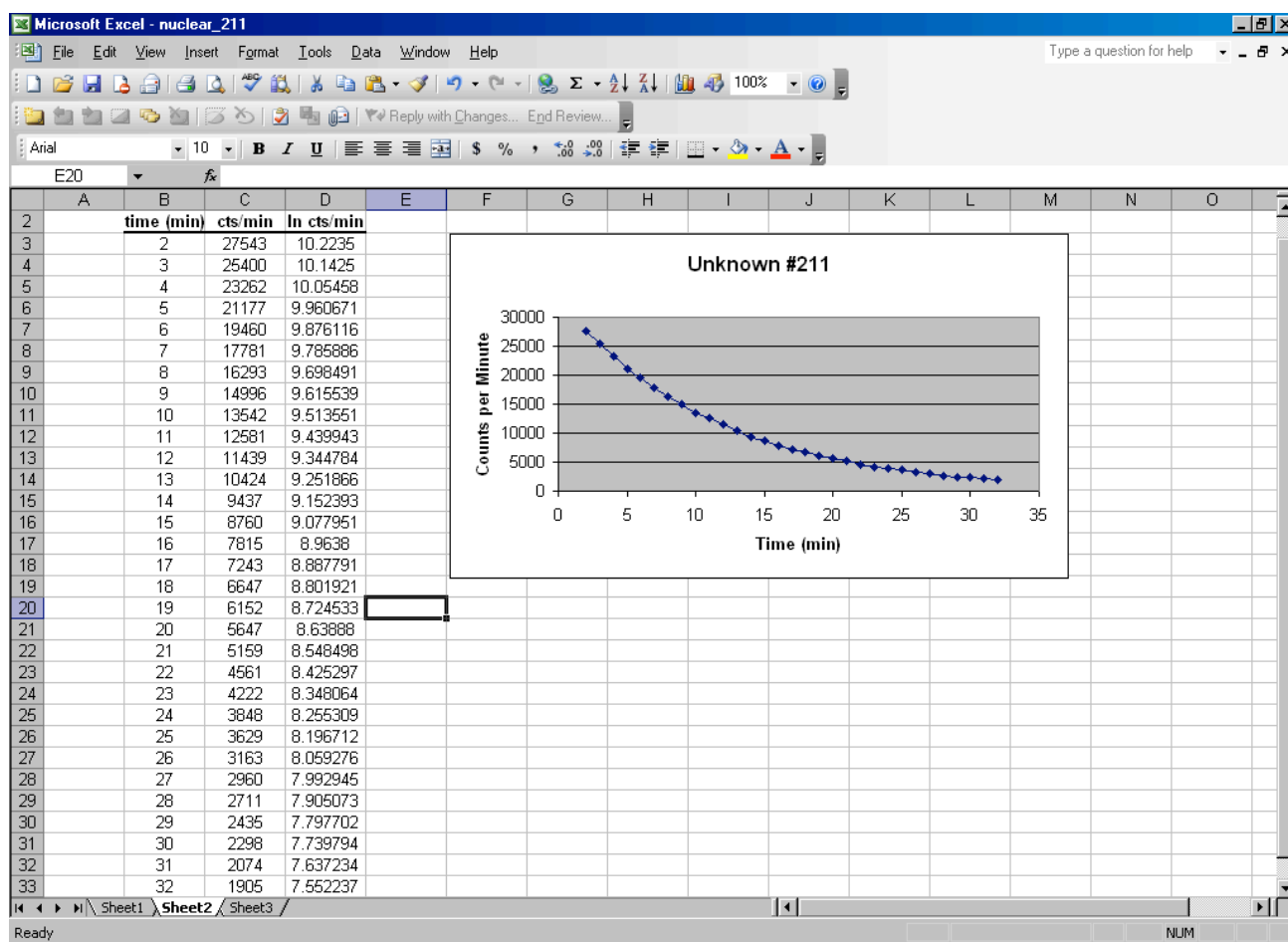 Your y values are counts per minute.

Next.

If you choose to place the chart in the sheet, then you can print multiple graphs at a time. When a chart is assigned a new sheet, it will print individually. We recommend choosing the "object" in sheet option.
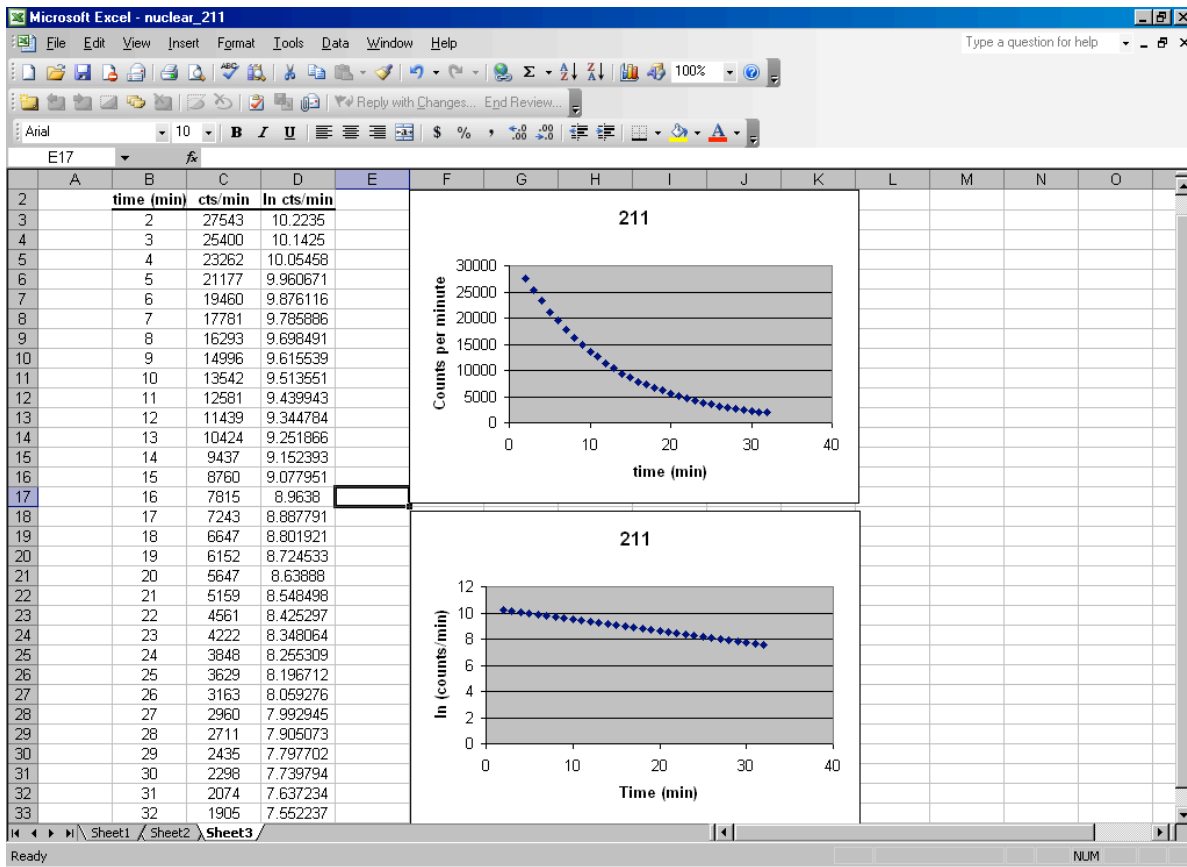
Select Finish.

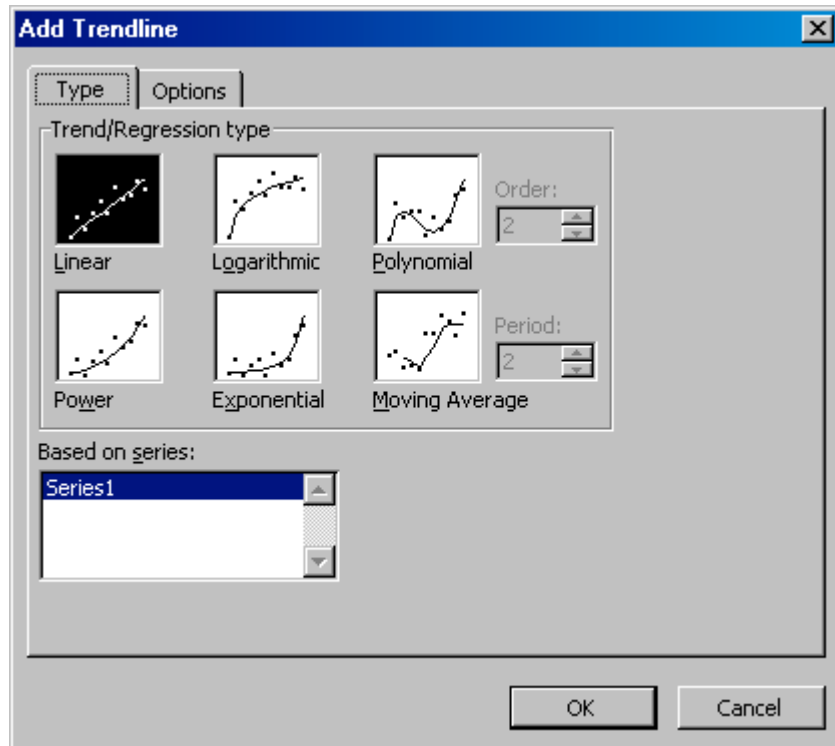If there is only one series, I generally left click on the "Series 1" box in the graph and delete it.

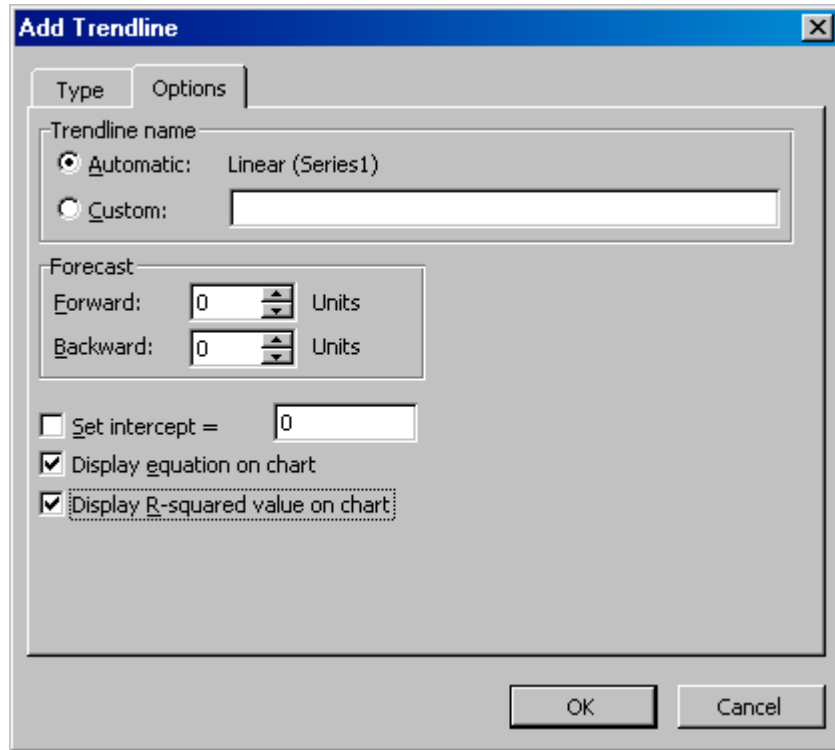Repeat using the ln cts/min for y.

How to make trendlines?

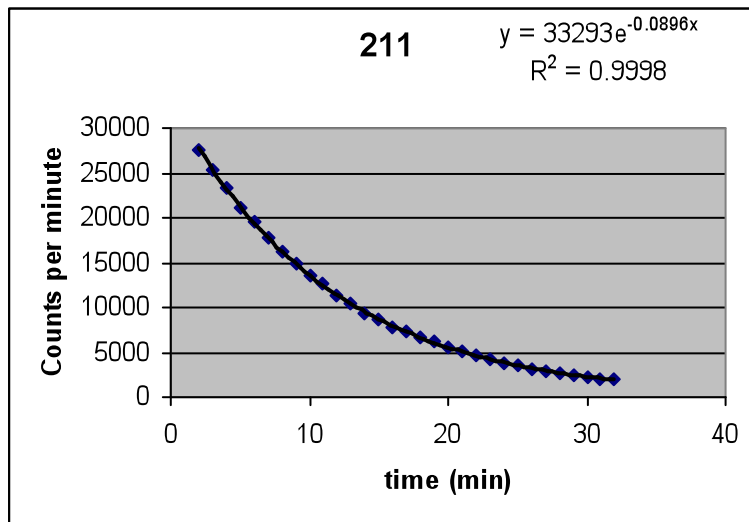Right click over the data (the blue diamonds). Choose the option "add trendline".

Under "Type" you want to choose "Exponential" for the counts/min and "Linear" for the ln cts/min graphs.
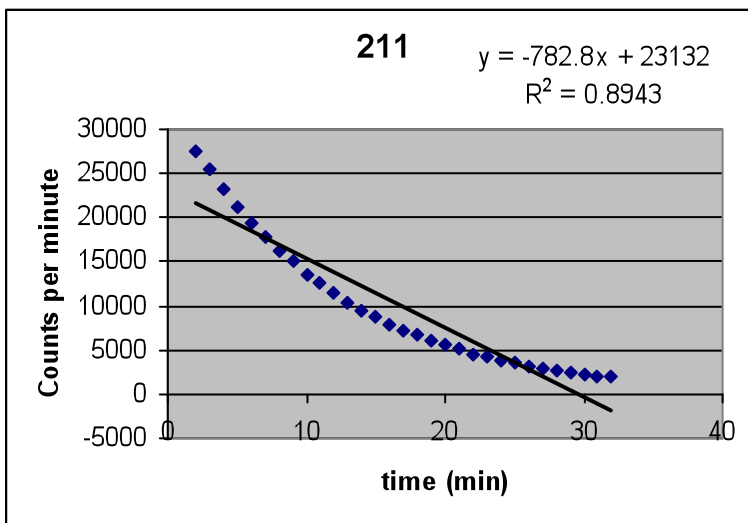
Click on the "Options" tab and check the last 2 boxes: "Display Equation" and "Display R-squared". The R^2 tells how close the regression fit of the trendline is to the given data. For the simulated data it is probably 99+% or 0.99+. For the reactor data, you might get a more meaningful regression value.

Add Trendline

Type | Options

Trendline name
○ Automatic: Linear (Series1)
○ Custom:

Forecast
Forward: 0   Units
Backward: 0   Units

☐ Set intercept =   0
☑ Display equation on chart
☑ Display R-squared value on chart

OK   Cancel

If you did it right, the graph should look like this.

211 $y = 33293e^{-0.0896x}$
$R^2 = 0.9998$

If you did it **wrong** the graph will look like this and you need to go back and change your trendline from linear to exponential.

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$y = -782.8x + 23132$
$R^2 = 0.8943$

(Chart: Counts per minute vs. time (min), with data points and a linear trendline)

Another way that people have been doing it **wrong** is by choosing logarithmic instead of exponential. If that is the case, your graph will look like this.

211

$y = -10267Ln(x) + 36837$
$R^2 = 0.9927$

(Chart: Counts per minute vs. time (min), with data points and a logarithmic trendline)
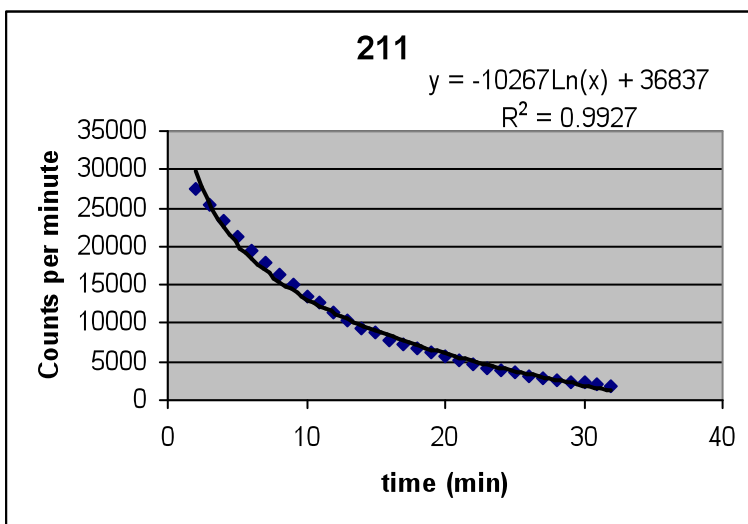
You don't have to redo the graphs. Just right click on the trendline. You will get the option of format trendline. Then under type just choose exponential and the equations will automatically update.

How to get Zero Values?
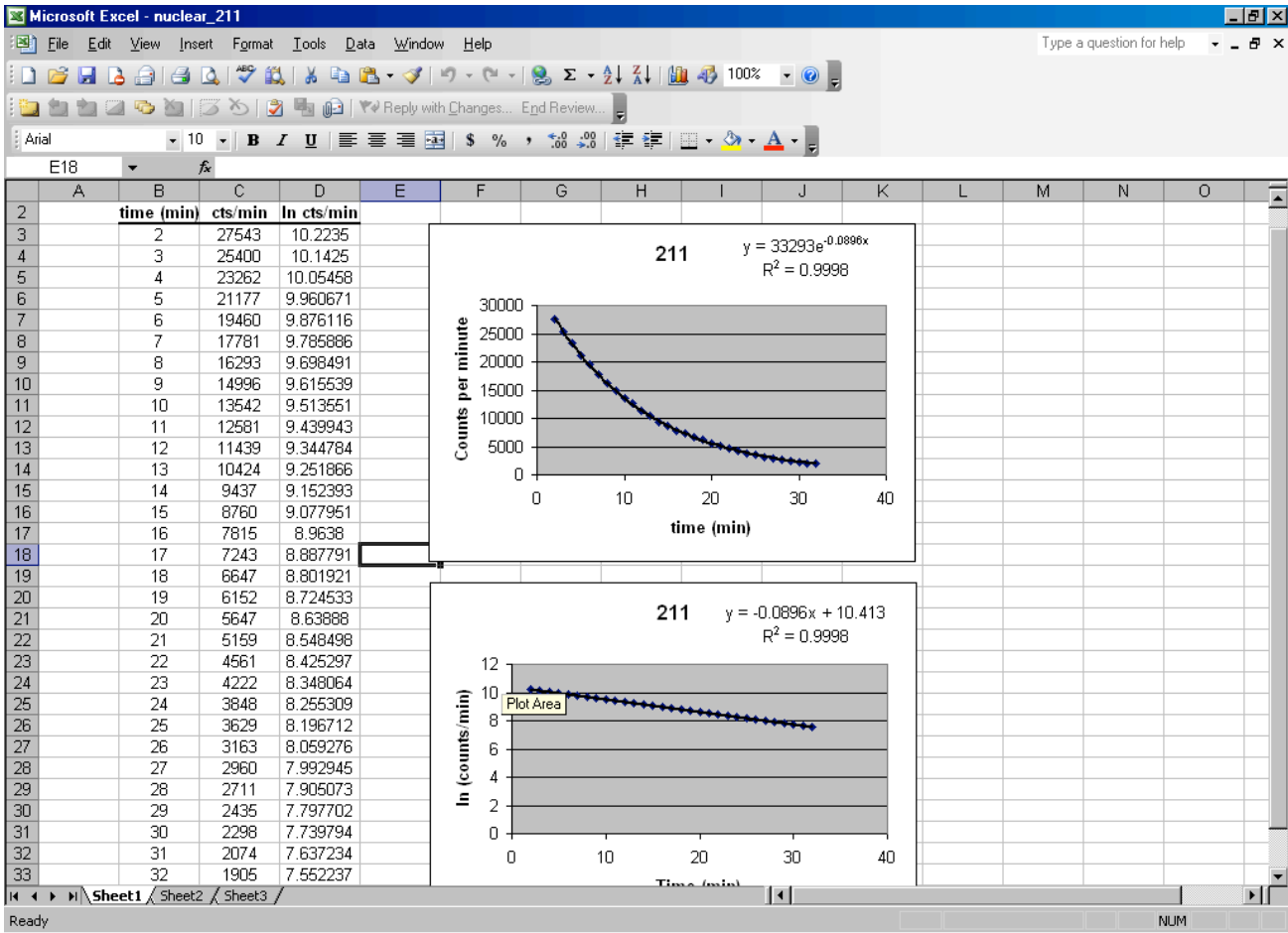
You get your zero values from the trendline equations on the graphs.

For the exponential graph $\quad A = A_o\,e^{-kt} \quad\quad A_o = \text{cts/min zero value}$
For the linear graph $\quad\quad \ln A = -kt + \ln A_o \quad \ln A_o = \ln \text{cts/min zero value}$

In the graphs above for unknown 211

time (min)	counts/min	ln counts/min
0	33,293	10.413

My "k" value is 0.0896 and my half life would be (ln 2/ 0.0896).