

Warm-up Problems - February 20, 2006

How to do a least squares fit for a non linear fit: EXCEL

This is the outline of the steps to follow. Remember that the main point is to make your excel file look like the excel file on my webpage.

1. Put your data into columns A and B .
2. Graph your data using Excel:
 - (a) Click on Insert→Chart, XY(scatter) (there are other choices, but this works well.
 - (b) You need to click the “Series” Tab at the top of excel. This lets excel know that you have x and y values.
 - (c) Then you need to add a series. Click on “Add”. Then in the “X-values” you need to enter the cells for the x -values. Do a similar thing for the y values.
 - (d) In theory, at this point, your graph should look nice and the rest is just making it look nicer. Make it as nice as possible.
3. Decide what your model equation is going to be. For the example done in class (and the excel sheet on the webpage), We will try to fit $y = Ae^{Bx} + C$.
4. Set up two more columns next to the x and y columns. I labelled mine: “ $Y=A*\exp(B*x)+C$ ” and “residual squared”. (You will put formula’s into these cells, hang tight).
5. Set up cells for you A , B and C off to the side. These need numbers, I put in a 1 for each one.
6. Formula for column “ $Y=A*\exp(B*x)+C$ ”. In the first data row, I entered:

$$=G\$4*EXP(\$G\$5*A4)+\$G\$6$$

The dollar signs are important in the “G” entry and no dollar sign is important on the “A” entry.

7. No, make sure this gives you a number in that cell when you press return. Then, highlight that well, type control-C to copy the cell. Then, highlight all the cells in that column and type control-V to paste this formula into all the cells.
8. Next, set up the “residual squared” column. Enter the formula

$$= (B2 - C2)^2$$

Do the trick you did before to copy this formula to all the cells. This sets up all the residuals squared.

9. We now just have to add the square residuals. Set up an entry labelled “sum of squares”. In this cell type “=sum(” and then highlight all the residual cells you set up. Then press return.
10. Now, all the hard work is done. We now just enter the solver:

- (a) Tools→Solver
- (b) Target Cell: this is your sum of squares cell
- (c) Equal to: min (you want to minimize the sum of the squares!
- (d) By changing cells: highlight your A,B,C cells, these are the things you are allowed to change.
- (e) Press “Solve” and it figures out A , B and C .
- (f) (You may want to repeat this step a few times, Excel seems to improve its approximations each time.)