Excel: A Quick Tutorial

Excel is a spread sheet program, which enables you to do many repeated operations. When you open Excel, you should see something like this (but bigger!):

	A	B	C	D	E
1					
2					
3					

Navigating. Each little box is called a cell, and it comes with a name such as A2 (column A, row 2) or D3 (column D, row 3). To navigate between cells, you can use the mouse, move the cursor on a cell and click once. You can also move around using the arrow keys.

· *Try to navigate to D3 by using the arrow keys on the keyboard.*

Entering and editing data. In each cell, you can enter text, numbers, or formulas involving other cells and their content. To enter text or numbers, go to the cell, write what you want to put in the cell and press on the *return* (or *enter*) key.

· *Enter some numbers in cells A1 - A5 and some other numbers in cells B1-B5.*

If you need to edit what you wrote, you can use the *delete (or backspace)* key. If you don't want to delete everything you have written in a cell, you have to double click on a cell. You can then use the arrow keys or the cursor to navigate within that cell. Press *return* (or *enter*) when you have finished editing.

· *Enter some text in some cell in column D, and practice editing it.*

Entering formulas. Excel has a big library of formulas you can use. For Euler's Method, we will only need multiplication and addition. To enter a formula you *must always precede it by an = sign.* The formula can involve the content of other cells, which are called by their names.

· *For Cell C1 to display the content of A1 + the content of B1, enter =A1+B1 in Cell C1. Then press return.*

Useful trick: Instead of writing A1, you can just click on A1 when you want to enter it.

Repeating a formula. Now we come to the real power of spreadsheets programs: their ability to repeat operations. Instead of entering =A2+B2, =A3+B3 etc… to sum your data in columns A and B, click on C1 and notice how there is a small square that appears on the lower right corner of the outlined cell. Bring the cursor to that little square. It becomes a solid black cross.

· *With the cursor on the little square of the lower right corner of the outlined Cell C1, click and drag down the mouse over column C, keeping the mouse button down.*

Column C should now display the sum of Columns A and B, term by term. Imagine the time I save in adding up your grades!

Repeating formulas involving a fixed cell. Click successively on Cells C2, C3 etc… Do you notice that you see "=A2+B2, =A3+B3, ….". In other words, Excel knew that you wanted the formula to relate to the row you were in: it shifted the row index automatically. Sometime (as we will see in Euler's formula) you

may need to enter a formula which refers to a fixed cell, without shifting index. In order to do so, you put a $ sign in front of the entity (row or column) that you want fixed.

- *Enter the number 10 in Cell E1. To multiply column C by 10, enter* ***=C1*E$1*** *in Cell D1. Press return. Then click on D1 again, click and drag it down, with the cursor on the lower right corner.*

You know now all you need to know in order to program Euler's method!

Euler's Method with Excel

We are looking at the differential equation **w'= .02w** of pages 103, with time step 10 years. You must adapt this spread sheet for other equations and times steps, and thus for integrals as well.

By hand, we obtained a chart that looked like (see page 107):

	A	B	C	D	E
1	Dt	t	w	w' (=.02w)	Dw (w'Dt)
2	10	0	6	0.12	1.2
3		10	7.2	0.144	1.44

Once you entered the first line (of text) in Excel, you can enter the third one by doing the following: enter 10, 0 and 6 (our choice of Dt and initial time and value) in A2, B2, C2. Then:

- *In B3, enter* ***=B2+A$2***

(this will increase time by Dt=10 at each step)

- *In C3, enter* ***=C2+E2***

(This gives the new population= old population + increase Dw)

- *In D2, enter* ***= .02*C2, In D3, enter = .02*C3***

(This is the crux of the program, where you enter the differential equation at hand w'= .02 w. Different equations will give you different entries here).

- *In E2, enter* ***= D2*A$2, In E3, enter = D3*A$2***

(This gives you an *approximation* of the increase of population during that stretch of time)

- *Now select all of B3, C3, D3 and E3 by dragging the clicked mouse over them (****but not on the little square yet).*** *Remove your finger from the mouse,*
- *Click again* ***on the little square*** *at the corner of E3, and drag the mouse down. The four columns B, C, D, E are being evaluated at once! Stop once time t has reached the value you want it to be.*
- *See what happens when you change the value of Dt in Cell A2.*
- *Compare with Slinky*

Try other equations!

You can try your hands on other equations. Try the Logistic equation for instance…

More advanced:

Try the chart wizard to graph your data. Select the w column first.