An Introduction to Microsoft Excel

CS 310 — Fall 1999

In this handout, we will discuss how to use a spreadsheet to do numerical computations. To do this, we'll use the Microsoft spreadsheet program "Excel". To start Excel, go to `Start -> Programs -> MS Office 97 -> Microsoft Excel`.

1 A Simple Spreadsheet

A spreadsheet consists of a whole bunch of "cells." Each cell is labeled by its column letter and row number. So, the cell in the top left is called "Cell A1". The next one over is "Cell B1".

A cell can contain text, a numerical value, or a formula. Usually, you'll want most of the spreadsheet to contain cells with numerical values or formulas, with a few cells containing text that serve as labels for the numbers.

The "current cell" is highlighted. This highlighted bar is often called the "cursor" or the "cell pointer". When you start Excel, the cursor is on cell A1. If you use the arrow keys, you'll move the cursor around the spreadsheet.

We'll get started by creating a simple spreadsheet. The purpose of it will be to calculate the mean and standard deviation of a list of numbers.

1. First we need to enter the numbers. To enter a number into the current cell, you simply type the number. So, to enter the number 85 into cell B2, you move the cursor to B2 and type:

   ```
   85
   ```

   and then press the Enter key.

   See if you can get your spreadsheet to look like what's shown below.

   If you make a mistake, you can delete an entry by moving the cell pointer to that entry and entering the new value. The old value will be overwritten.

	A	B	C
1			
2		85	
3		76	
4		91	
5		72	
6			
7			
8			

2. Now we'll put a label for the information in column B in cell A1. Move the cursor to cell A1 and type:

   `data`

   and then press Enter.

3. Next, we'll calculate the sum of the data in column B. Do this by moving the cursor to cell B7 and typing:

   `=sum(b2:b5)`

   You should see in cell B7 the sum of the values in column B: 324

4. The mean is the sum divided by 4, the number of data values. We'll put this value in B8. Move the cell pointer to B8 and type:

   `=b7/4`

   You should see 81, which is the average of the numbers. Now, your spreadsheet should look like this:

	A	B	C
1	data		
2		85	
3		76	
4		91	
5		72	
6			
7		324	
8		81	

5. To make the spreadsheet look a little nicer, we'd like to label the sum and mean.

   (a) In cell A7, type `sum =` and press Enter.

   (b) In cell A8, type `mean =` and press Enter.

   Your spreadsheet should now look like this:

	A	B	C
1	data		
2		85	
3		76	
4		91	
5		72	
6			
7	sum =	324	
8	mean =	81	

6. Try modifying a few of the data values. For example, try changing the value of B2 from 85 to 80. The values for the sum and the average should change to 319 and 79.75. When you've finished experimenting, change the numbers back to those listed in Part 5.

7. Now we will compute the standard deviation of the numbers.

   (a) In cell A9, type `stdev =` and press Enter.

   (b) In cell B9, type `=stdev(b2:b5)` and press Enter.

   Your spreadsheet should now look like this:

	A	B	C
1	data		
2		85	
3		76	
4		91	
5		72	
6			
7	sum =	324	
8	mean =	81	
9	std dev =	8.602325	

8. Now we're going to do some copying using absolute cell addresses, which means that the cell address remains fixed when the cell is copied to another location. A dollar sign ($) is used for this purpose. For cells C2 through C5, we will divide the cells B2 through B5 by the fixed average value, 81, in B8. Move the cursor to C2 and type:

   ```
   =b2/$b$8
   ```

   Then copy cell C2 to C3, C4, and C5. To copy a cell, select the cell you want to copy and drag the square in the lower right corner of the cell to the cell(s) where you want to place the copied value. Examine the formulas in cells C3, C4, and C5. Notice that the address B8 does not change, while B2 changed to B3 in cell C3, as does B4 in cell C4 and B5 in cell C5. Then copy the formulas in B7 to C7, B8 to C8, and B9 to C9.

   Your spreadsheet should now look like this:

	A	B	C
1	data		
2		85	1.049383
3		76	0.938272
4		91	1.123457
5		72	0.888889
6			
7	sum =	324	4
8	mean =	81	1
9	std dev =	8.602325	0.106202

9. If you want to see more decimal places in any cells in the spreadsheet, highlight the cells and go to the `Format` command on the menu bar and select `Cells`. Click on the `Number` tab and under the "Category:" select "Number". On the right you will see a selector for the number of decimal places. You can choose to have between 0 and 30 decimal places.

☞ See if you can use your spreadsheet to compute the mean and standard deviation of the numbers: 15, 14, 19, 9. The answers are 14.25 and 4.112988, respectively.

2 Saving and Printing your Spreadsheet

To save your spreadsheet, select `File` on the menu bar and select `Save`. A window will come up asking you where you want to save the file. On CAE machines, the `F:` drive is your network drive, and you can save files in folders there. You can also save to a floppy (the `A:` drive) if the file will fit on it.

If you want to print, go to `File -> Print`. The print job will be sent to the nearest printer by default.

3 "If" statements in Excel

Students are often confused by Excel "if" statements. We'll take a close look at them here.

Start with a clean spreadsheet and enter in the following:

1. A1: 50, B1: 999, C1: 2

2. A2: `=if(a1>10, a1, 0)`

This means type `50` when in cell A1, `999` when in cell B1, `2` when in cell C1, and `=if(a1>10,a1,0)` in cell A2.

You should see the number 50 in A2. If you change A1 to 5, A1 will contain 0. The syntax "`if(a1>10,a1,0)`" means that: "if what's in cell A1 is greater than 10, use A1. Otherwise, use 0." Thus, if you enter in 50 in A1, A2 will take on the value of A1 since this is greater than 10. If you enter 5 into A1, the value is 0 since 5 is not greater than 10.

☞ Try entering the `if` statements below into cell A2. Change the value of A1 to a few different values after you enter each if statement so you can see what is happening.

Formula	**Explanation**
`if(a1=50,1,0)`	If A1 is 50, this cell will contain the value 1. Otherwise, this cell is 0.
`if(a1=50,b1,c1)`	If A1 is 50, this cell is whatever is in cell B1 (which is 999). If A1 is not 50, this cell is whatever is in C1 (which is 2).
`if(a1>0,b1,c1)`	If A1 is positive, take the value in B1, 999. If not (i.e., if A1 is negative or zero), take the value in C1, 2.
`if(not(a1<0),b1,c1)`	This means: If A1 is non-negative, take the value in B1. If not (i.e., if A1 is not "not negative" i.e., ≥ 0), take the value in C1. This is almost the same as the previous example, but is different if cell A1 contains 0.

4 Interest Problems (optional)

Excel provides a few commands to solve financial problems:

- `FV(rate,nper,pmt,pv,type)` returns the future value of an ordinary installment with the payment made at the end of each term, at a fixed interest rate.
- `PMT(rate,nper,pv,fv,type)` returns the payment for an ordinary installment with the payment made at the end of each term.
- `PV(rate,nper,pmt,fv,type)` returns the present value of an ordinary installment with the payment made at the end of each term, at a fixed interest rate.

Example 5.1: How much will accumulate in a savings account in 15 years if \$500 is deposited in the account at the end of each month during that time? The fixed annual rate is 2.3%.

Example 5.2: Mr. Kim wants to buy a car. He plans to get a loan from his bank. The fixed interest rate is 8.99%. At a dealer he found two cars that he was interested in. The price of Car A is \$13,000, and the price pf Car B is \$15,000. He can afford \$350/month for the four years, the term of the loan. On his budget, can he buy Car B instead of Car A?

Example 5.3: With his new platinum card, Ben has puchased a new stereo system for \$650 and will be making payments of \$45/month. If the annual interest rate is 18%, how long will it take to completely pay off the stereo? (Hint: you will need to experiment with the number of terms)

5 Other Excel Functions

Excel has many built-in functions for common calculations. If you go to `Insert -> Function` from the menu bar, you'll see see the categories and function names. To learn about any function, select it and click on the "Help" question mark in the lower left corner. Here are some you might find useful:

Mathematical Functions:
`min(range)` returns the smallest value in the range.
`power(x,y)` returns the result of x raised to the power of y, i.e., x^y.
`pi` returns the value of π, 3.141592...
`exp(x)` returns the value of e raised to the power of x.
`abs(x)` returns the absolute value of x.
`sqrt(x)` returns $\sqrt{x}$.

Statistical Functions:
`avg(range)` returns the mean of the values in the range.
`sum(range)` returns the sum of the values in the range.
`stdev(range)` returns the standard deviation of the values in the range.

Trigonometric Funtions:
`cos`,`sin`,`tan`,`acos`,`asin`,`atan`