

**Geol 300 Lab 3**  
Due Monday, February 14.

**Software:** Microsoft Excel and powerpoint

**Concepts:** file transfer, averages, standard deviations, correlation.

*Remember to save your work (both in excel, word, and powerpoint) periodically!*

**Overview.** Excel is an example of a spreadsheet program. Spreadsheets combine the power of a calculator with word processing and a database. They can be very useful. We will first calculate the average of a set of numbers by typing in a formula and then with a built-in equation. Hints: equations in excel always begin with an equals sign.

In this lab (and following ones) a good write-up is essential. You should not just include the answer, but provide explanatory text.

**Results:** A lab write-up and a powerpoint presentation showing the results of an analysis of San Diego rainfall. The lab write-up should contain an introduction and clearly labeled answers to all of the questions here, as well as any equations. Spelling counts. Email me the results as an attachment and (include geol 300 and lab 3 excel as the subject) and a hardcopy. Note that it is possible to print more than one powerpoint slide on a page.

**1)** Start Excel. Type in the following numbers in column A. It is the monthly rainfall for San Diego for the year 1941 in mm)(Jan through Dec).

52 135 150 85 0 0 2 1 7 74 57 72

Select values A1 through A12 and then click on the summation sign (weird-looking jagged E) on the tool bar. A number (the total rainfall) should appear in cell A13. Now click on the cell below it. On the formula bar, type = then click on cell A13, then type /12 in the formula bar. The monthly average should appear in cell A14.

*In lab write-up:* Look up the equation for the average using your favorite statistics book, google, your brain, or some other reputable source and put into the report (using equation editor). Explain what an average is and what some of the other names for the average are.

- a) How many months have rainfall near the monthly average?
- b) Is the average a good method of predicting the average amount of rain per month?
- c) How many digits are there to the right of the decimal on the average?
- d) How digits are there to the right of the decimal place for the monthly values?

The monthly values are rounded off to the nearest mm.

Change the number in cell A6 to 1.5 from 2.

e) How does this affect the average (how many digits change)? Change the number in cell A6 to 2.4.

f) How many digits change? (Now change A6 back to 2).

Even though there are several digits to the right of the decimal, these digits are not **significant** because the data itself is not that precise.

Click on the average, then click on formats, cells. Change the category to number and the number of decimal places to 0.

Excel has some common formulas built in. Go under help, index and type "average" for an alternate way of calculating the average.

**3.)** Type in (or copy and paste) the following numbers in columns B and C. This is the rainfall for the years 1988 and 1989.

23	35	15	94	2	0	0	0	0	0	35	57
11	18	18	3	1	2	0	0	6	12	2	26

Find the total rainfall for each year and the monthly average, as before, for each year. In column D calculate the average for each month over the three years. Formulas can be copied and pasted from cell to cell (and to ranges of cells). See help *contents, creating formulas, editing formulas, move or copy a formula*. In column E calculate the standard deviation (stdev) for each month of the three years.

What is the formula for standard deviation? What good is it?

**a)** How well does the average for each month over three years match the rainfall for each month?

**b)** Does the standard deviation help in assessing how well the average matches?

Click in cells A1. Go to insert, rows and add a row at the top. Now add a column to the left. Label each column at the top and each row at the left. Copy it to your word doc.

**4.)** Charts. Go to the chart wizard (by moving the mouse slowly over the icons it will show a little bubble explaining what they do) and make a plot of rainfall in 1941. Save as a separate sheet. Do the same for 1988 and 1989. Copy and paste the charts to your word document.

**a)** Looking at the graphs, which years look like which other years?

Go back to the worksheet and go to help, index. Type correlation. You should see a function called "correl" which calculates the correlation, or similarity between two series. Click on C17, then enter

= CORREL (B2: B13, C2: C13) in the formula bar. This shows the correlation between the rainfall in 1941 and 1988 as a number between 0 and 1 (0 is no correlation, 1 is perfect correlation). Calculate the correlation between 1988 and 1989.

**b)** What pairs of years showed better correlation?

**c)** Does this match what you expect from the graphs?

**5.)** Download the San Diego precipitation and temperature files since 1850. Right click on each link and save target as a file. Do this for both temperature and precipitation.

6.) Load this file into Excel. Use *file, open* and then follow the directions. You may have to change files of type to files of type txt to see the filename in the open window. On the Mac it may put blank rows in the data - if so *sort* (under *tools*) by the first column.

- a) Make a chart of the mean annual rainfall and mean annual air temperature in San Diego since 1850. (hint: under chart wizard, select series at step 2 and add another series). Clicking on the axis allows you to change scale, etc. Clicking on the data points allows you to plot on a secondary axis among other things. Copy to your word document.
- b) Calculate the correlation between rainfall and air temperature. Save all files. Hand in a copy of the Excel spreadsheet and your lab write-up (with charts of San Diego rainfall and air temperature).

Extra credit: Put months instead of numbers at the bottom and plot the temperature in Fahrenheit instead of Celsius.

**Powerpoint.** Powerpoint is another widely used program used to make presentations. Start it and make a 3 slide presentation with a title and name on the first page, a graph of one of your results on the second, and a conclusions slide telling me what you think was most important. You can cut and paste from Excel. Figure out how to change the background and add animation and explain how in the write-up.