INTRODUCTION TO COMPUTER TOOLS

OBJECTIVE: To familiarize yourself with the computer programs and utilities that will be used throughout the semester by performing some simple tasks using ***Microsoft Excel***, ***Kaleidagraph***, and ***Microsoft Word***.

THEORY

Microsoft Excel is a spreadsheet program that allows you to manipulate text as well as data and run calculations that would otherwise be very time consuming. After learning a few basic commands and formatting skills you will be able to calculate any mathematical string you like using the same methods.

A few starters:

- Text is entered into a "cell" simply by typing the desired text and pressing "Return".
- A mathematical formula is entered by first typing "=" (an equals sign) followed by the desired formula.

For example, to compute 5+6, type "**=5+6**" into an empty cell and press "**Return**". The desired answer, "11", appears in the cell where you entered the formula. The actual formula you entered in the cell appears at the top of the screen underneath the menu bar. This works for any cell. If you are in an unfamiliar spreadsheet and want to see the formula for a particular cell, all you have to do is "click" on the cell using the mouse, and the formula for that cell appears at the top of the spreadsheet.

Kaleidagraph is a graphing program that we will use to analyze the data we compute in the spreadsheet. To do this, we need a way to transfer the data from ***Excel*** to ***Kaleidagraph***. We will use a typical method called "copy and paste". This involves using the mouse to highlight the data we want to move, copying the data to the "Clipboard" and pasting it into the empty cells in ***Kaleidagraph***.

Once we have the data we can make a graph that will show us quickly and easily what trends or relations the data exhibits. ***Kaleidagraph*** is versatile and allows the user's complete control over how the data will be presented. It is up to the user to decide (or be instructed!) as to what kind of graph will be the best.

After we have analyzed our data through relevant calculations and graphs, we can write about the results using ***Microsoft Word*** along with a short introduction. (See the Report Example file in the *PHY251* folder). Ideally, the spreadsheet we created in ***Excel*** and the graph we made in ***Kaleidagraph*** can be pasted into this document as well, and the whole saved as one complete document. This is what we will do today with some relatively simple calculations involving sine and cosine functions. Keep in mind that the exactly same principles used in this introductory lab session will appear again and again throughout the semester.

PROCEDURE

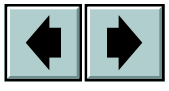
Open up the empty spreadsheet for this week which can be found in the folder entitled *Introduction to Computers* on the Desktop. To open the folder double click on it with the mouse. Double click on the document entitled *intro_empty*. You will see a Spreadsheet with short instructions, and 3 columns. Fill the column labeled X with numbers ranging from 0 to 6, in steps of 0.2. In the column next to this one, you are going to compute the sine of X. To do this, click on the cell to the right of the cell containing 0 of the X column. Type in "**=Sin(*the cell which contains 0*)**" and hit "Return". To specify "the cell which contains 0" you can do one of two things: either type in the cell coordinates of that cell, for example "**B6**" or you can type in "**=Sin(** " and then click on the cell which contains 0 (with the mouse) and finally "**)**" and hit "**Return**". This will give you the answer to Sin 0 in the second column.

This is great - but you want the sine of every X value you entered! No, you don't have to repeat this procedure for every X value. Now that you've done one, you can tell ***Excel*** to repeat this function for every cell in your x-column. To do this, click on the cell where the answer to sin 0 appears. This is called "selecting a cell". You can tell the cell is selected, because it is outlined by the color of the cursor. Now we can copy the formula from the highlighted cell to the special part of the computer memory called "Clipboard". This part is used to temporarily store the data if you want it to copy it from one part of your document to another (or even to another program). To copy the formula from the cell to the clipboard, simply hit "⌘-C" (the open-apple key next to the spacebar and C-key at the same time). When the formula is copied, You can paste it to another cells in the column "Sin X". Highlight them ("drag" the cursor all the way down to the end of the column) and press "⌘-V". This should complete all the calculations in the rest of the column.

Repeat this same procedure, only this time for Cos X.

Once this is done, you are ready to transfer data into ***Kaleidagraph***. First you have to copy the relevant data using the same "⌘-C" - "⌘-V" sequence to copy and paste. Click on the first cell containing "0". Highlight across to the cell with the value for Cos 0 in it, and all the way down to the last row. All the data you need should now be highlighted. Hit "**⌘-C**" (for Copy), and the highlighted area now becomes surrounded by a traveling dashed line. Now you need to open up ***Kaleidagraph***. It is under the Apple Menu in the top left-hand corner. Once this is done, you see a table of three columns labeled A,B, and C. (You can change their names easily by double clicking on them - Do this after you've transferred your data - Call the first X, the second Sin X and the third Cos X). To paste your data into the ***Kaleidagraph*** table, click on the first cell in column A and hit "**⌘-V**" (V is for Paste). All your values will automatically fill the first three columns.

Now you are ready to make a graph. On the menu bar select *Gallery*, by pressing and holding down the mouse key. This opens up what is called a "pull down menu". From this menu select *Linear* and then *Scatter*. This option will create a scatter-plot of the points you computed for Sin X and Cos X - the same as if you graphed the points out by hand on paper. A menu box will pop up asking you to specify which columns are to be plotted on the x and y-axes. Select the X column for the x-axis, and both Sin X and Cos X for the y-axis. (You are plotting Sin X *and* Cos X versus X). Select *New Plot* . After a few seconds, your graph will appear. Now you are ready to experiment with all the options of ***Kaleidagraph.*** You can double click on almost anything in your graph to change it. For example by clicking on the title, you can change it to something more appropriate than "DATA 1". Do this! The same goes for the axes labels. Have some fun with the options

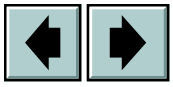


on the menu bar too. Try doing a *Curve Fit* to your points. Try the *Smooth* option for best results.

Once you are happy with the results, save them! Instructions for how to do this will be given in class.

You have data, you have a graph. You can transfer them into ***Microsoft Word*** while you are writing up your introduction and conclusion. See the Lab Report Example in the *PHY251* folder. This report can be used as a template, or you can create one of your own - just make sure you include everything you need. To copy your spreadsheet, you can highlight the information you want to copy, and Paste into your Word document using "⌘**-C**" and "⌘**-V**". To paste your graph into Word, use the *Copy Graph* option under the *Edit* option in the menu bar, then paste into Word using "⌘**-V**"**.** Save your completed document in the *Results/Your section* folder for your section which can be found on the desktop. Complete instructions on how to save a file will be given in class.

If all went well - you are done! With the time remaining to you, it is suggested that you stick around and familiarize yourself with the computers. You can for example cruise the Net with Netscape, or check on your e-mail by telnetting into your Pilot account. Try the graphing calculator, or spend some more time with ***Kaleidagraph*** or ***Excel.***



FIT VIEW

1) Fill the x column with values from 0 to 2Pi in steps of 0.2

2) Compute sine and cosine of these x values in the last two columns

3) Transfer only the cells containing numbers to Kaleidagraph!

x	Sinx	Cosx