Lab 1: Intro to Excel, Part 1

The objective of this lab exercise is to create properly formatted data tables, graph and calculations using Microsoft Excel.

Every week in lab you will measure data and report that data in a ***data table***. The data table should be properly formatted so that your data are displayed in a way that is easy to read and interpret. Today we will not measure any data; the data you will use will be provided for you. The goal for today is to create and properly format a data table.

After creating the data table, you will plot the data it contains on an ***xy-scatter*** graph. Most of our graphs in this course will be "***xy-scatter***" graphs in our labs. This style of graph plots points that are determined by ordered pairs of data, i.e. each point has an "x-coordinate" and a "y-coordinate" that are taken from two columns of data.

As with your data table, it is important that the graph is formatted properly so that the data displayed in the graph can be easily read and interpreted.

Your data table today will include 4 columns of data with 21 rows. The data for your table is provided by Problem 56 from Chapter 2 of the 4th Edition of our text. *The original problem is shown on Page 3 of this outline.*

Creating Your Data Table

- Note there is a block of cells, 9 columns by 26 rows, that are gray. These cells will be used for your data table. Start by adding a border around the block of cells. To do this, highlight the block of cells and choose the "outside" border from the Borders menu in the toolbar.

- Eliminate the gray shading by highlighting the block of cells (they might still be highlighted from the previous step), then choose "No Fill" from the *Fill* menu (also in the toolbar, probably next to the Borders menu.)

- Highlight columns B, D, F, H and J by first clicking on the "B" at the top of the column, then click on the others while holding down the Ctrl button. Drag (at the top of the column) any one of the highlighted columns until it is narrow. When you release the mouse button, all five columns should be the same narrow width.

- Highlight rows 9 through 29 by clicking on the "9" to the left, and drag down to "29" while holding the left mouse button. Expand these rows to approximately twice their initial height by dragging any one of the rows (at the very left) downward. When you release the mouse button, all 21 rows should now be the same expanded height. (Note: these rows will contain your data.)

- Highlight rows 5, 7 and 30. Make them narrow. Then increase the height of rows 6 and 8 to approximately twice their original size.

- Merge cells C6 through I6 to create one long cell on row 6. This is for your title.

- Add a "Bottom Border" to cells C8, E8, G8 and I8. These cells will contain your data column labels.

- Highlight the entire data table. Format the cells to center everything horizontally and vertically. You can use the Alignment buttons (one set for horizontal, one set for vertical) in the toolbar for this.

- Add column headers that describe each column of data. Include units in parentheses. They should look like this:

  Time (s) **Height (m)** **t_{mid} (s)** **v_{avg} (m/s)**

  (Note: your column headers should look exactly like these, including the subscripts. To subscript, highlight just the text to be subscripted, right click and choose Format Cells)

- Add a title. Your data table title should be a description of who, what, why, where, when and/or how the data was collected. Use the space to provide some relevant information to whomever is looking at your data.

- Add data. The first two columns of *measured data* must be typed in. **This data is provided for you at the top of Page 3, below.** The latter two columns of *calculated data* should be calculated by Excel. For each column, write the appropriate equation in the top data cell and then use "copy & paste" or "fill down" to copy the equation to the rest of the cells in the column.

- Note that the Time data is of a regular interval, i.e. every 0.25 second, so you can make Excel fill it in for you. The Height data is "independent", so each value must be typed into its cell.

- The last two columns, t_{mid} and v_{avg}, must be calculated by Excel. Write the equation for t_{mid} in cell G10. Be sure to use the references to cells C9 and C10 in your equation. Hit enter, then copy the equation to the remaining cells (i.e. G11 to G29.) Repeat the process with the equation for v_{avg} in cell I10, which should then be copied to cells I11 to I29.)

- Format the data in all four columns to two decimal places by highlighting all the data and using the decimal place buttons in the toolbar.

The data you will need for the data table is here:

Astronauts on a distant planet toss a rock into the air. With the aid of a camera that takes pictures at a steady rate, they record the height of the rock as a function of time as given in the Table P2.56. (a) Find the average velocity of the rock in the time interval between each measurement and the next. (b) Using these average velocities to approximate instantaneous velocities at the midpoints of the time intervals, make a graph of velocity as a function of time. Does the rock move with constant acceleration? If so, plot a straight line of best fit on the graph and calculate its slope to find the acceleration.

Time (s)	Height (m)
0.00	5.00
0.25	5.75
0.50	6.40
0.75	6.94
1.00	7.38
1.25	7.72
1.50	7.96
1.75	8.10
2.00	8.13
2.25	8.07
2.50	7.90
2.75	7.62
3.00	7.25
3.25	6.77
3.50	6.20
3.75	5.52
4.00	4.73
4.25	3.85
4.50	2.86
4.75	1.77
5.00	0.58

Your data table should now be complete, with all data in place and formatting applied properly. Ask me to take a look at it. When I give you the ok, move forward to the graph.

The problem asks you to create a graph using the latter two columns of data in your data table. We will accomplish this in Excel!

Creating Your Graph

- Highlight the two columns of data (highlight *only* the data, not the label at the top of the column) that you want to graph. It's ok to include the small column (i.e. Column H) with your highlight. Since it's empty, it will not show up on your graph.

- Use either the "Insert" menu and select "Chart", or use the Chart shortcut.

- Select the basic ***xy-scatter*** format which displays the data points only (i.e. no lines.)

- Delete the chart Legend; we will rarely use this. Delete the grid lines on the graph.

- Resize the plot area by dragging any corner to create space for labels for each axis.

- Click on Chart Tools at the top of the screen, then click Layout (also at the top of the screen.) Use the menu bar that appears to add a title and axis labels to your graph. Your title and axis labels should be exactly the same as those on your graph (i.e. title is the same, axis labels are the column headers from the data table.)

- Move the horizontal axis down to the bottom of the plot area by right clicking on any number of the scale on the *vertical* axis. Choose Format Axis from the pop up menu. (Then look at the options carefully.)

- Right click on any number on the horizontal axis, choose Format Axis and format the scale to zero decimal places. Also make sure the scale has a *major unit* every “1”.

- Repeat the previous step for the vertical axis.

- Resize the axis labels, the numbers on your axes and your title so they are not too small and not too large.

After you finish formatting your graph, you’re ready to move on to Part 2!