

GISAT 151 Lab 1a: How to Make an Excel Spreadsheet

INTRODUCTION

The purpose of this exercise is to familiarize you with some of the features of Microsoft EXCEL®. In this exercise, you will be guided through a tutorial for making an EXCEL® spreadsheet to record and calculate semester grades for a class of students. The tutorial is self-paced so you can save your work and complete it at a later time. You will need to save your work on a floppy, zip disk, or CD. There are minor differences between the various versions of EXCEL® and so some of the instructions may be slightly different if you are working with a version of EXCEL® other than the one in Microsoft Office XP.

Your instructor will show you how to access the electronic version of this tutorial from Blackboard. Blackboard is an electronic tool that professors can use to organize your class information and assignments, send email to the class, and even record grades. Since Blackboard is a web application, you can access it from anywhere you can access the web.

EXCEL® spreadsheets are called workbooks. A workbook is made up of worksheets. Imagine a workbook as a notebook that has many sheets of paper in it. Each worksheet within the workbook is independent. The worksheets within a workbook can communicate with each other. Furthermore, different workbooks can also communicate with each other.

The EXCEL® screen has a main menu and toolbars at the top. See the attached picture of the EXCEL® screen to locate the main menu and the two toolbars. Other tool bars, including a drawing toolbar, can be added to the top or bottom of the screen (from the main menu, select **View/Toolbars** and select the toolbar you wish to add). New icons can also be added to the existing toolbars (from the main menu, select **View/Toolbars/Customize/Commands** and drag desired icons from the **Commands** area to the existing toolbar area).

The class in this tutorial has 15 students. Over the course of the semester, students take quizzes, turn in homework (HW), and have exams. In addition, there is a grade for class participation/professionalism (CP/P). The quiz grades and the HW grades are recorded in separate worksheets of the workbook, and then the quiz and HW grade totals feed into a third, or summary, worksheet. The entire workbook is therefore made up of three worksheets: the Quiz worksheet, the HW worksheet, and the Summary worksheet. The Summary worksheet also contains the exam grades and the CP/P grades. In the Summary worksheet, letter grades are assigned to each student at the end of the semester depending on their final percentage. An "IF" statement is used to assign the letter grade.

This tutorial must be done electronically because the data needed for constructing the spreadsheet are formatted to be copied from this document to your EXCEL® spreadsheet. To toggle between this document and your EXCEL® spreadsheet, use **Alt + Tab**.

DELIVERABLES

The deliverables for this lab are due by the beginning of the next lab period. No late work will be accepted. At the beginning of lab you must turn in a paper copy of your correctly formatted

EXCEL® workbook (consisting of the three EXCEL® worksheets) with the appropriate cover page attached. The format for the cover page is shown below. Also, by the beginning of the next lab, you must deposit the electronic version of your EXCEL® spreadsheet into the digital drop box of Blackboard using the required naming convention for the EXCEL® file. Your instructor will show you how to name your EXCEL® file and how to deposit your EXCEL® spreadsheet into the Blackboard digital drop box. Your EXCEL® file should be named as *exactly* as specified below. Incorrectly named files will have points deducted.

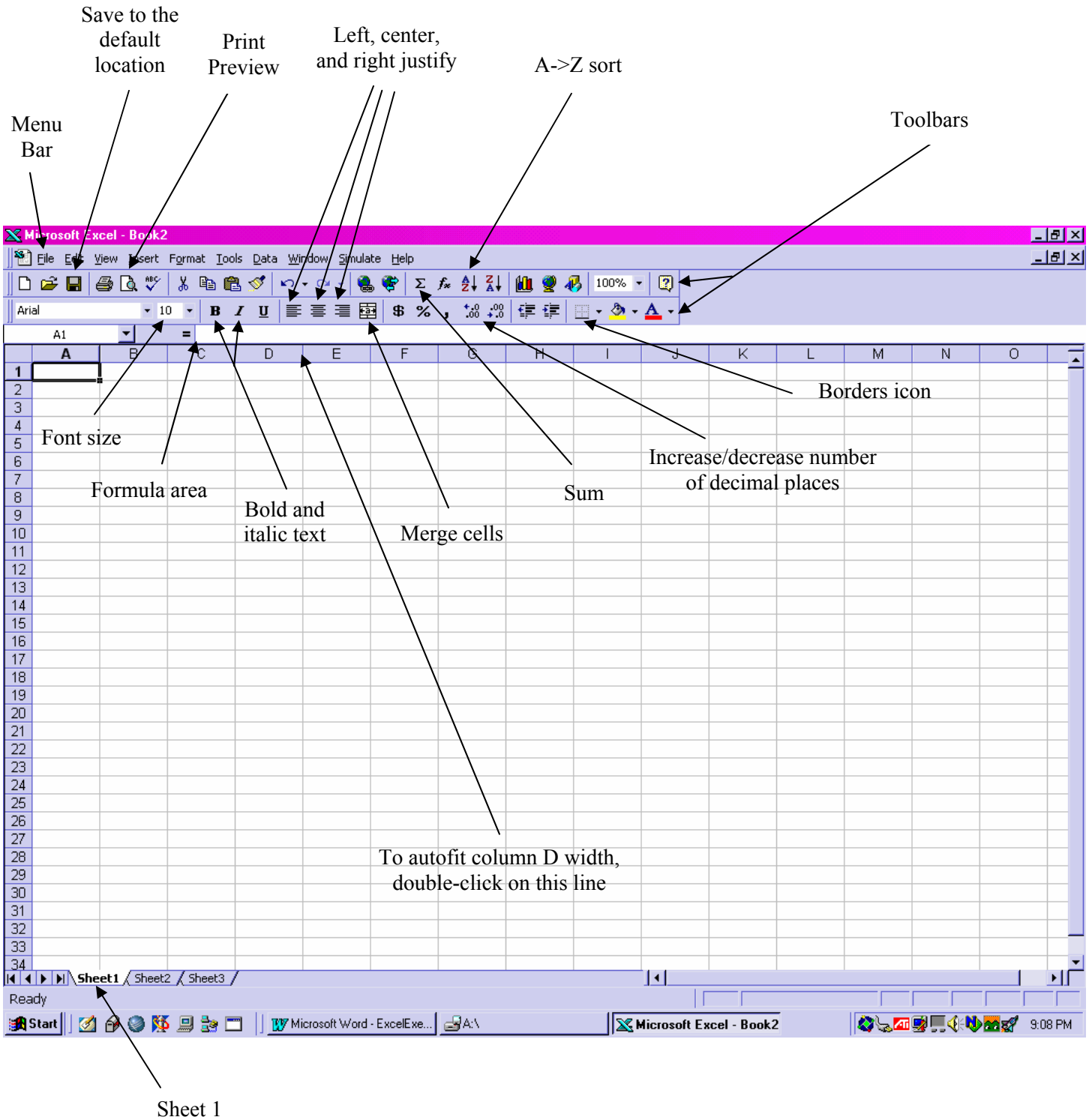
yourlastname_lab1a.xls

Example: smith_lab1a.xls

COVER PAGE FORMAT

<p style="text-align: center;">Assignment Title</p> <p style="text-align: center;">Your Name GISAT 151 Section ___ Date due Your email address Collaborated with:</p>

SAMPLE EXCEL® SCREEN



DATA

Names of students

Picasso, Pablo
O'Keeffe, Georgia
Da Vinci, Leonardo
Michelangelo
Greco, El
Holbein, Hans
Rembrandt
Whistler, James A. M.
Cezanne, Paul
Van Gogh, Vincent
Monet, Claude
Manet, Edouard
Degas, Edgar
Renoir, Auguste
Rubens, Peter Paul

Quiz Grades (in alphabetical order)

10	15	9	15	9	15	10	15	10	15
10	15	9	14	10	14	9	13	9	13
10	14	9	12	9	13	8	12	8	12
8	13	9	12	9	13	0	12	8	12
9	10	10	10	10	10	6	10	10	11
10	15	9	14	10	14	9	13	9	13
10	14	9	12	8	12	8	14	9	15
9	13	9	14	8	12	8	14	9	15
10	15	10	15	10	15	10	14	10	14
8	10	10	9	7	10	10	9	10	13
8	9	8	9	8	10	10	9	10	9
7	10	8	9	9	10	10	9	10	11
9	12	8	9	10	10	9	9	9	14
10	10	10	10	10	10	9	9	10	9
10	15	9	14	10	14	9	13	9	13

Homework Grades (in alphabetical order)

20	18	20	17	19	20	16	17
18	15	17	19	14	16	17	16
20	17	19	20	16	17	16	20
17	19	20	16	17	16	20	19
20	16	17	16	20	16	17	16
19	20	16	17	16	16	17	16
20	18	20	17	19	20	16	17
20	16	20	18	19	20	16	17
17	16	20	19	19	20	15	17
20	18	19	17	19	19	16	17
10	10	15	16	19	17	12	17
19	18	20	17	19	20	15	17
20	18	20	14	19	20	16	17
20	14	19	17	19	18	17	17
20	18	20	17	19	20	16	17

PROCEDURE

The step-by-step procedure is outlined below. Be sure to follow the steps exactly as indicated and in the order indicated.

1. Highlight the names of the students above and then press **Ctrl C**. This places the list of names on the Microsoft Office® clipboard. The clipboard is a temporary storage location in the computer's memory.
2. Go to the **Start** menu and select **New Office Document**. When the New Office Document screen comes up, highlight **Blank Workbook** and click **OK**. A new, unnamed EXCEL® spreadsheet will come up. Note that in EXCEL®, the rows are numbers and the columns are letters by default (though this may be changed to all numbers by selecting **Menu/Tools/Options/General** tab and putting a check in **R1C1 reference style**).
3. To now paste the list of student names into the EXCEL® spreadsheet, highlight cell A5 and press **Ctrl V**. The student names will then be pasted into cells A5 through A19. To automatically widen column A, place your cursor on the line at the top of the columns that divides the column A label from the column B label. See the attached picture of the EXCEL® screen to locate the line that similarly divides columns D and E. Double click on the line that divides the column A label from the column B label. Column A will then automatically widen to the optimal width.
4. Insert your storage device so that you may save your work to it. For this exercise, a floppy disk is recommended and we will refer to the storage device as a floppy disk in this exercise. From the main menu, select **File/Save As...** Browse through the directory structure at the top of the Save As dialog box until you find the **3½ Floppy (A:)** drive. Double click on the 3½ Floppy (A:) drive to open it. Type in the filename you want to use to save your work and then click on **Save** to save your work.

5. To alphabetize the student names, first select/highlight the entire list of names. From the main menu, select **Data/A->Z Sort**. A Sort dialog box will appear. If it is not indicated as such in the Sort dialog box, select **Sort By Column A** in *Ascending* order. Click **OK**. The names will now be alphabetized. Note that once you had highlighted the names, instead of going to the Data/A->Z Sort menu, you could have clicked on the A->Z Sort icon in the toolbar. See the attached picture of the EXCEL® screen to locate the A->Z Sort icon in the toolbar.
6. To insert a new column for numbering the student names, highlight any cell in column A. From the main menu select **Insert/Columns**. A new column will be inserted before column A, and the columns will be re-lettered at the top to reflect the insertion. To save your work as the default filename in the default directory (which is now your floppy disk), select **File/Save** from the menu, or just click on the Save icon in the toolbar. See the attached picture of the EXCEL® screen to locate the Save icon.
7. To number the students in the class, go to cell A5 and type in 1 <ENTER> then 2 <ENTER>. Notice that hitting <ENTER> moves the cursor to the cell below. Now select cells A5 and A6. Go to the bottom right hand corner of the cell A6 and grab the little black box. Drag the little black box down and note that sequential numbers appear as you drag. The cells you are dragging through will be filled with these numbers. Drag all the way down to number 15.
8. Automatically adjust the width of new column A as in Step 3 above. Next we want to left justify the column of numbers. To left-justify cells A5-A19, select the cells. Go to the Left-Justify icon in the toolbar and click on it. See the attached picture of the EXCEL® screen to locate the Left-Justify icon.
9. We will need to have three different worksheets in this workbook: one for quizzes, one for HW, and one for the summary worksheet. We will name this first worksheet *Quizzes*. To do that, go to the bottom of the screen and right-click on **Sheet1**. See the attached picture of the EXCEL® screen to locate Sheet 1. A menu comes up. Left click on **Rename** and immediately start typing in the word *Quizzes*. Do the same for Sheet2 and name it *Homework*. Do the same for Sheet3 and name it *Summary*. To move between the worksheets, simply click on the worksheet name and you will be taken to that worksheet. Worksheet order can be rearranged by simply dragging and dropping worksheet names.
10. Now we will make the *Homework* worksheet and the *Summary* worksheet look identical to the *Quizzes* worksheet. To copy the names, highlight cells A5-B19 in *Quizzes*, copy the cell contents by hitting **Ctrl C**, go to the *Homework* worksheet, highlight cell A5, and hit **Ctrl V**. Ctrl V pastes the contents of the clipboard exactly as they were copied. Adjust column widths. Go to *Summary*, highlight cell A5, and hit **Ctrl V** to paste. Adjust column widths. **SAVE YOUR WORK!**
11. We will now format the worksheets, starting with *Quizzes*. To adjust the column width for the ten columns that will hold the semester quiz grades, highlight column C through column L in any row. From the main menu select **Format/Column/Width**. A dialog box comes up. In the dialog box, type in 8 for the column width and then click **OK**. Starting in cell C3, type in *Quiz 1* and hit the right arrow -> to enter and move to cell D3. In cell D3 type in *Quiz 2* and hit the right arrow -> to enter and move to cell E3. Do the same in each cell up to *Quiz 10* in cell L3. **SAVE YOUR WORK!**

12. Highlight the cells containing the words *Quiz 1* through *Quiz 10*. To bold these column titles, click on the Bold icon in the toolbar or hit **Ctrl B** on the keypad. To center-justify, click on the Center-Justify icon in the tool bar. See the attached picture of the EXCEL® screen to locate the Bold icon and the Center-Justify icon.
13. In cell M3, type in *Total Pts*. In cell N3, type in *Percentage*. Set the width of column M to 9 and the width of column N to 10. Bold and center-justify the contents of cells M3 and N3. **SAVE YOUR WORK!**
14. Put in the number of points each quiz is worth in the cell just under the quiz number as follows: odd-numbered quizzes are worth 10 points and even numbered quizzes are worth 15 points. Bold and center-justify the quiz points.
15. To sum quiz points, highlight cell M4. Click on the Autosum Σ icon in the toolbar and hit <ENTER>. See the attached picture of the EXCEL® screen to locate the Σ icon. This “autosums” cells C4 through L4, which is indicated by the flashing dashed line. Another way to do this is to highlight cell M4 and type = to begin an equation. Then double click on the Σ icon and hit <ENTER>. It should sum cells C4 through L4, indicated again by the flashing dashed line. After you do this, if you select cell M4 and look in the formula area, the formula for M4 shown in the formula area should be =SUM(C4:L4). See the attached picture of the EXCEL® screen to locate the formula area. **SAVE YOUR WORK!**
16. To calculate the percentage earned, highlight cell N4. Start writing an equation by typing =, then type 100*. Click in cell M4, type in a /, click in cell M4 again, then hit <ENTER>. Center justify and bold the contents of cell N4. The formula in cell N4 should be =100*M4/M4.
17. To put a title on the *Quizzes* worksheet, first merge cells A1 through N1 by highlighting them and then clicking on the Merge icon in the toolbar. See the attached picture of the EXCEL® screen to locate the Merge icon. Click in the formula area to put the cursor there, and then type the word “Quizzes.” Bold and center justify the text, and increase the font size to 16 point. See the attached picture of the EXCEL® screen to locate the font size. (To unmerge cells, you must go to the main menu and select **Format/Cells.../Alignment tab** and uncheck **Merge cells**). **SAVE YOUR WORK!**
18. Do the same thing for the *Homework* worksheet that you did for the *Quizzes* worksheet. The title should be the word “Homework.” Note, however, there are only eight homework assignments and each is worth 20 points. Put 20 in cell C4, format it, and then copy its contents to cell D4 through J4 by highlighting D4 through J4 and hitting **Ctrl V**. **SAVE YOUR WORK!**
19. To place the quiz grades shown in this document into the *Quizzes* worksheet of the workbook, highlight the matrix of quiz grades and hit **Ctrl C**. Place your cursor in cell C5 of your *Quizzes* worksheet and hit **Ctrl V** to paste the grades into the spreadsheet. Highlight cells C5 through L19 and center justify.
20. Sum the grades for each person in the *Total Pts* column using the technique described in 15. Or alternately, you may also copy the formula from M4 to cells M5 through M19. Note that the formatting follows, and so if you copy the formula from cell M4, to cells M5 through M19, then you will have to undo the bold.

21. To calculate the grade percentage for each person, start by copying the contents of cell N4 into cell N5. What happens? Look at the formula in cell N5. What is wrong with the calculation? It is time to talk about relative and absolute addressing. EXCEL® calculates formulas by looking at the relative location of the cells that are in a formula. So if a formula calls for using the cell to the immediate left, then every time that formula is copied to a different cell, the formula will always use the cell to the immediate left of where it is. This is called relative addressing, because the location of the cells used in the formula is relative to where the formula is. If you want to use the exact same cell every time you copy a formula, you must tell EXCEL® to do that. That is called absolute addressing, because you use an absolute address every time the formula is copied. To use an absolute address, place \$ signs in front of the row and column of the cell you want to absolutely address. Two examples are shown below. In addition to no absolute address (Ex: M4), you can absolute address the entire cell (Ex: \$M\$4), just the row (Ex: M\$4), or just the column (Ex: \$M4). You can toggle between these four conditions if you hit F4 while your cursor is on the cell in the formula area.

=100*M5/M4
relative addressing of M4

=100*M5/\$M\$4
absolute addressing of M4

22. Write a formula to calculate the percentage for the first student using the first student's total points divided by the total points possible (see above). Absolute address cell M4 and copy the formula to the other cells. Format for one decimal place by highlighting cells N5 through N19, and clicking in the toolbar on the icon for adjusting decimal places. See the attached picture of the EXCEL® screen to locate the icon for adjusting the number of decimal places.

23. Do the same thing as in 19-22 for the *Homework* worksheet.

24. To construct the *Summary* worksheet, begin by creating column titles from C3 through K3 for *Part/Prof*, *Quizzes*, *Homework*, *Exam 1*, *Exam 2*, *Final Exam*, *Percentage*, *Grade*, and *GPA Pts*. Bold and center-justify the column titles. Make the widths of C3 through K3 equal to 11. Merge cells A1 through K1 and type in the title "Summary." Bold and center-justify the title, and set the font to 16.

25. In cells C4 through I4, put in the fraction that the respective grade component is worth (see below). The total of the fractions is equal to 1.00. Highlight the cells containing the fractions and then from the main menu, select **Format/Cells.../Number tab/Percentage**. Type in "0" for the number of decimal places and hit <ENTER>. This assigns percentage formatting to the cells while retaining the fractional form for calculational purposes; that is, you see it as 15% but EXCEL® knows it's actually supposed to multiply by 0.15.

Fraction each component contributes to total grade

Part/Prof	5%
Quizzes	15%
Homework	15%
Exam 1	20%
Exam 2	20%
Final Exam	25%

26. Give all students a *Part/Prof* grade of 100 except for Rembrandt, who skipped half the classes and gets a grade of 50. Center-justify the cells.
27. To transfer the quiz and homework grades from the *Quizzes* and *Homework* worksheets, highlight cell D5. To begin an equation, type in “=”. Left click on the *Quizzes* worksheet title in the lower left-hand corner. This brings up the *Quizzes* worksheet. Place the cursor in cell N5 and hit <ENTER>. This completes the transfer of quiz percentage from the *Quizzes* worksheet to the *Summary* worksheet. Observe in the formula area the format of the contents of cell D5. How is the fact that the information comes from a different worksheet indicated? Do the same for the homework grade. To complete the process for the rest of the students, highlight cells D5 and E5. Hit **Ctrl C** to copy the formula to the clipboard and then highlight cells D6 through E19. Hit **Ctrl V** to paste the formula into each cell. Is this relative or absolute addressing? Fix the number of decimal places in the cells to one.
28. Copy the exam data below to the *Summary* worksheet.

Ex 1	Ex 2	Final
93	99	92
66	70	72
93	89	91
66	89	68
81	89	83
90	89	92
76	87	78
90	89	88
73	70	65
90	89	88
76	50	72
88	89	91
72	70	77
85	89	92
99	91	96

29. To obtain the final percentage, each of the components must be weighted by the appropriate fraction it contributes to the overall grade. To calculate the weighted percentage in cell I5, multiply each grade component by the appropriate fraction and sum the weighted components. Copy the formula to the rest of the cells. Be sure to use absolute referencing where necessary. Center-justify the percentage column and format the cell contents to show one decimal place. The formula shown in the formula bar for cell I5 should be

$$= \$C\$4 * C5 + \$D\$4 * D5 + \$E\$4 * E5 + \$F\$4 * F5 + \$G\$4 * G5 + \$H\$4 * H5.$$

30. Calculate the averages for the entire class for each of the different grade components. In cell C20, type “=**AVERAGE**(” and then highlight cells C5 through C19. Hit <ENTER>. This averages the contents of cells C5 through C19. Copy this formula to cells D20 through I20. Format the cells bold, center-justify, and show one decimal place. Note that EXCEL® is not case sensitive and will capitalize all reserved words and cell addresses, no matter how you type them in. Reserved words are words that have special meaning to the computer program. It is always good programming style to capitalize reserved words, and EXCEL® does it for you!

31. To assign letter grades to each student, you will need to write an “IF” statement in cells J5 through J19. The IF statement in this case will look at the percentage in the previous column and assign a letter grade to the cell where the IF statement is based on what the IF statement says. To see how an If statement should be written in EXCEL®, from the main menu, select **Help/Contents and Index/Index tab** and type in the word “IF.” Click on **Display** to display the topic, select **IF**, and click on **Display**. Information on the syntax of the IF statement is displayed. Read the information on the syntax of the IF statement.
32. The IF statement in the cells in column J contains three things: 1.) a test condition, 2.) what to do if the test condition is true, and 3.) what to do if the test condition is false. The syntax looks like this:

=IF(test condition, do this if statement is true, do this if it is false).

We will write the IF statement so that the test condition will be the bottom of a letter grade range. For example, if the A’s will go as low as a percentage of 93, then the IF statement in cell J5 will test the contents of cell I5 and see if the grade is greater than or equal to 93. If so, it will assign a grade of A in cell J5. If not, it will move on to the next test condition, which will be another IF statement with a test for the bottom of the A- range, and so on. This will result in a series of “nested” IF statements, because the result of the test condition being false will always be another IF statement. There may be up to eight nested IF statements in EXCEL®. Using the grade range information below, write a series of nested IF statements in cell J5 to assign grades of A, A-, B+, B, B-, C+, C, C-, ***. The *** will be the result if all test conditions are false; that is, the grade is below the C- range. You can fix that grade manually to a D. A sample of part of the nested IF statement for cell J5 is shown below. You can finish the rest of it. Be careful to keep track of () in the construction of your IF statements! Note that the actual grade letter, which is an alpha (as opposed to a number), is in quotes like this “ ”. Format the cells bold, center, and use one decimal place.

=IF(I5>=93,"A",IF(I5>=90,"A-",IF(I5>=87,"B+",IF(I5>=83,"B",IF(I5>=80,.....

Bottom of Grade Range

A	93
A-	90
B+	87
B	83
B-	80
C+	77
C	73
C-	70

33. Next assign GPA points to the grades using a similar IF statement. GPA point equivalents are shown below. Format the cells bold, center, and use one decimal place. Calculate the average GPA for the class in cell K20. Manually fix the GPA points for the student that had the very low grade.

GPA Points

A	4.0
A-	3.7

B+	3.3
B	3.0
B-	2.7
C+	2.3
C	2.0
C-	1.7

34. To put a border around the text, in *Quizzes*, highlight the text to be bordered (A1 through N19) and go to the Borders icon in the toolbar. See the attached picture of the EXCEL® screen to locate the Borders icon. Repeat for the *Homework* and *Summary* worksheets.
35. To print out your spreadsheets, first go to *Quizzes* and select the area to be printed by highlighting it. From the main menu, select **File/Print Area/Set Print Area** and hit <ENTER>. Do the same for the *Homework* and *Summary* worksheets. To format *Quizzes* for printing, from the main menu, select **File/Page Setup/Page tab** and select **Landscape**. To put the printout on only one page, click in **Fit to** and put in 1 page wide by 1 page tall. Select the **Margins tab**. Adjust the margins to 1 inch each and center the printout vertically and horizontally. If you want a header or footer, select the **Header/Footer tab** and choose a header or footer from the pull-down menu. To print out *Quizzes* with gridlines, select the **Sheet tab** and check **Gridlines**. Repeat this formatting for the *Homework* and *Summary* worksheets.
36. Preview your work by selecting from the main menu **File/Print Preview** or by clicking on the Print Preview icon. See the attached picture of the EXCEL® screen to locate the Print Preview icon.
37. Print out your entire workbook by selecting from the main menu **File/Print** and selecting **Entire Workbook** and clicking **OK**. The default print is to print the current worksheet only.

GISAT 151 Lab 1b: How to Make an EXCEL Chart

INTRODUCTION

The purpose of this exercise is to familiarize you with some of the graphing features of Microsoft EXCEL®. In this exercise, you will be guided through a tutorial for making a set of EXCEL® graphs (called “charts” in EXCEL®). The tutorial is self-paced so you can save your work and complete it at a later time. You will need to save your work on a floppy, zip disk, or CD. There are minor differences between the various versions of EXCEL® and so some of the instructions may be slightly different if you are working with a version of EXCEL® other than the one in Microsoft Office XP.

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When making charts in EXCEL®, the chart from specific data can be put on the worksheet where the data themselves are (called “embedded”), or the chart can be put in a new worksheet in the same workbook. You make that choice when you create the chart. In either case, the chart can be printed out all by itself. In the case of an embedded chart, the chart and the data can also be printed out together. Charts may be custom formatted; for example, the size and fonts can be changed, a legend can be included, the scale of the axes can be adjusted, colors can be changed, data points can be labeled with the data value, and data points can be connected or not connected and smoothed or not smoothed. In addition, a “best fit” function (e.g., linear, n -degree polynomial, logarithmic, or exponential) can be determined and placed on the chart, along with the best-fit correlation coefficient (called R^2), which measures the best-fit function’s “goodness of fit.”

In this exercise, “click” means left-click. Right-click is expressly stated as such. Things to be entered into cells are indicated in double quotes; however, do *not* type the quotes.

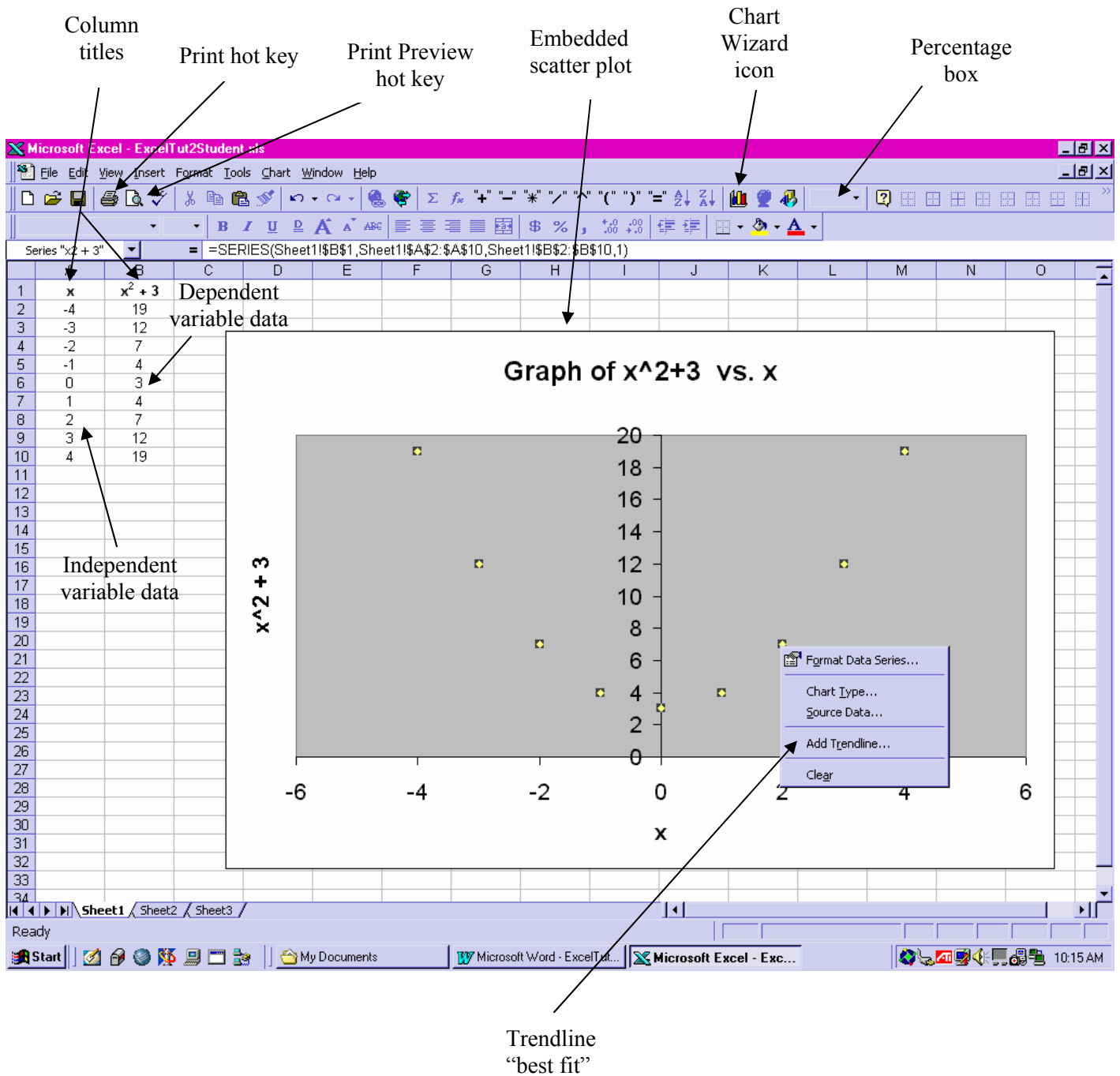
DELIVERABLES

The deliverables for this lab are due _____. No late work will be accepted. At the beginning of lab on the due date, you must turn in a paper copy of the two spreadsheets with the embedded charts and the one chart only as specified in Part I steps 21 and 22 and Part II step 13 and the appropriate cover page. The format for the cover page was given in the last lab. Also, by the beginning of the lab on the due date, you must deposit the electronic version of your EXCEL® spreadsheet into your instructor’s Blackboard digital drop box using the required naming convention for the EXCEL® file. Your EXCEL® file should be named as *exactly* as specified below. Incorrectly named files will have points deducted.

yourlastname_lab1b.xls

Example: smith_lab1b.xls

SAMPLE EXCEL® SCREEN (Data and embedded EXCEL® chart)



PROCEDURE PART I: MAKING A CHART OF DATA

The step-by-step procedure is outlined below. Be sure to follow the steps exactly as indicated and in the order indicated.

1. Open Microsoft EXCEL® and start a new worksheet. In cell A1, type in the letter “x” and in cell B1, type in “x2 + 3.” Be sure and put a space before and after the “+” sign. Center-justify and bold the contents of cells A1 and B1. Select/highlight cell B1 and from the formula area, highlight the number 2 (note: the highlight may extend all the way to the right). From the **Main Menu**, select **Format/Cells...** and click in the **Effects** box beside **Superscript**. Hit **OK**. This makes the 2 look like an exponent.
2. In cell A2, type in “-4” and hit <ENTER>. Highlight cells A2-A10. From the **Main Menu**, select **Edit/Fill/Series...** When the dialog box comes up, select **Series in:** Columns, **Step value:** 1, **Type:** Linear. Hit **OK**. Cells A3-A10 should fill in with -3 through 4 in steps of 1.
3. In cell B2, type in an “=” sign then select cell A2. A2 now appears in the formula. Type “^2+3” and hit <ENTER>. Do *not* put spaces in the formula before or after the “+” sign in this case! Note that the ^ operation in EXCEL® is the way to exponentiate a number to the power after the ^ symbol. The contents of the formula area for cell B2 should look like this: =A2^2+3.
4. Copy the formula from cell B2 to cells B3-B10. Verify that the contents of the B cells are mathematically correct. Center-justify the contents of cells A2-B10. **SAVE YOUR WORK!**
5. Highlight cells A1-B10. In the **Main Menu**, click on the **Chart Wizard**. See the attached picture of the EXCEL® screen to locate the Chart Wizard icon. When the Chart Wizard dialog box comes up, select **Chart type:** XY (Scatter) and **Chart sub-type:** the first picture with the points only. Hit **Next**. It is important to note that the **Line** chart and **XY (Scatter)** chart are *not* the same. (You cannot do Trendline analysis with a Line chart.)
6. In the next dialog box, explore the **Data Range** and **Series** tabs to see how the data locations on the spreadsheet are noted in Chart Wizard. Compare the syntax of the data range entries to the locations of the data in the spreadsheet. Had we not highlighted the locations of the data in step 5 above, we would have to manually enter the data ranges now. Just for fun, in the **Series** tab, highlight and delete the contents of the **X values:** area. Click on the red and blue icon on the right side of the X-values box. The main dialog box will disappear. When the skinny dialog box comes up, take the mouse and select cells A2-A10 on the main spreadsheet. This puts a dashed blinking box around cells A2-A10. Hit <ENTER>. The main dialog box will reappear and the appropriate data range will now appear in the X-values area. Hit **Next**. **SAVE YOUR WORK!**
7. In the next dialog box, select the **Titles** tab. For the **Chart title**, type in “Graph of x2 + 3 vs. x”. You can exponentiate the “2” in the title by highlighting just the “2” and selecting **Main Menu/Format/Format Selected Chart Title** and checking superscript. You can italic the “x” by highlighting just the “x” and hitting the **Italic** hot key in the toolbar. Then the title will look like this: “Graph of $x^2 + 3$ vs. x ”. Close the dialog box. Oops! Now get the dialog box back again by clicking on the chart and then go to **Main Menu/Chart/Chart Options**. Take a minute to examine all the other things that are available under **Main Menu/Chart**.

8. In **Main Menu/Chart/Chart Options**, go to the **Titles** tab again. For the **Value (X) Axis** title, type in “Independent Variable” and for the **Value (Y) Axis** title, type in “Dependent Variable.” Under the **Gridlines** tab, uncheck **Major gridlines**. Under the **Legend** tab, uncheck **Show legend**. Under the **Data Labels** tab, alternately check the **Show Value** and **Show Label** options and look at the results. Which option displays the independent variable values on the chart? Which option displays the dependent variable values on the chart? Check **None** for Data Labels and then hit **Next**.

9. When the chart dialog box comes up, verify that the chart will be placed as an “Object in Sheet 1” and then hit **Finish**. The chart should be embedded next to the data table in Sheet 1. Adjust the relative size of the contents shown in the window by making the percentage shown in the **Percentage** box a number that will put cell N32 in the lower right hand corner of the viewable area. See the attached picture of the EXCEL® screen to locate the Percentage box. Highlight the chart and grab the lower right hand corner with the mouse. When the two-headed arrow appears, drag the mouse so that the lower right-hand corner of the chart is in the lower right-hand corner of cell N31. Drag the upper left-hand corner of the chart so that it is in the upper left-hand corner of cell E4. **SAVE YOUR WORK!**

10. Now we will add another function to the chart. Go to cell C1. Try to enter the formula “-x² + 12.” Note that EXCEL® may not want to do this; it is confused by the minus sign and wants to give you a value instead of text. So to let EXCEL® know that this is text and not a formula, remove the “=” and put an apostrophe in front of the contents of the cell instead. The contents in the formula area for cell C1 should look like this: '-x2 + 12. Be sure to exponentiate the “2.” To make the minus sign a little more recognizable, highlight just the minus sign. From the **Main Menu**, select to **Format/Cells.../Font** tab. Under **Font**: select **Symbol** and hit **OK**. This widens the minus sign. Center-justify and bold the contents.

11. Enter the values of cells C2-C10 using the numbers in column A as the independent variables as was done in cells B2-B10. The first value should be -4. Be careful! When entering the formula for cells C2-C10, the value of the quantity “x²” is negative; that is, -(x²) not (-x)²! You will need to use parentheses because EXCEL® will not know exactly what we mean unless we are very specific. **SAVE YOUR WORK!**

12. To incorporate the data from cells C1-C10 into our chart, right-click anywhere on the background of the chart and select **Source Data...** Select the **Series** tab. Click anywhere in the **Series** box and then click **Add**. Click on the blue and red icon in the right side of the **Name:** box. The main dialog box disappears and a skinny one appears. Select cell C1 as the name of this series and hit <ENTER>. The main dialog box reappears with cell C1 entered as the name of this series. Click on the blue and red icon in the right side of the **X values:** box. The main dialog box disappears and a skinny one appears. Highlight cells A2-A10 as the source of the X data and hit <ENTER>. The main dialog box reappears with cells A2-A10 entered as the source of the X data. Do likewise for the **Y Values:**. Hit **OK** to exit. A new function should appear on your chart. Why is this function “upside down” with respect to the first one?

13. We need to change the title of the chart because we have added another polynomial function and the old title is no longer accurate. Click near either end of the chart title and click again while holding down the mouse and dragging it over the title to highlight it. Type in the words “Graph of Second-Order Polynomial Functions.” **SAVE YOUR WORK!**

14. To change the appearance of the data points of our new function, right-click on any of the new data points. Select **Format Data Series...** Under **Marker** select **Custom** and scroll down to choose a round dot. For **Size**: select 6. Use **Foreground** and **Background** to change the color of the dot. Change the appearance of the original function data points to a 6-point diamond. Hit **OK** to exit.
15. To format the chart background, right-click anywhere on the background of the chart. Select **Format Plot Area...** Under **Area**: select any color to be the background color of your chart. For no color in the background (best when printing out in black and white), select **None**.
16. To re-scale the x-axis, point the mouse pointer at the x axis and right click. Select **Format Axis...** and click on the **Scale** tab. Make the **Minimum**: -8, the **Maximum**: 8, the **Major unit**: 1 and the **Minor unit**: 0.5. To make the Minor unit tick marks show up, select the **Patterns** tab, and in the **Minor tick mark type** box, select **Inside**. Select the **Font** tab and make the font size of the numbers on both the x and y axes 8 point. **SAVE YOUR WORK!**
17. To format your spreadsheet including the embedded chart for printing, first click anywhere on the spreadsheet to select the entire spreadsheet.
18. From the **Main Menu**, select **File/Page Setup...** Click on the **Page** tab. Make the orientation of the output **Landscape** and check the box **Fit to 1 page(s) wide by 1 page tall**.
19. Click on the **Margins** tab. Make the four margins 1" each. Center the output vertically and horizontally by checking the appropriate boxes at the bottom. Do *not* use gridlines in your printout.
20. Click on the **Header/Footer** tab. Using the drop-down menu in the header area, scroll down and select the option *Prepared by your name and today's date, Page 1*. If such an option does not exist, then select **Custom Header** and type in under the center section exactly as it is written here: "Prepared by your name &[Date]". (Be sure to type in your own name!) Type in the right section: "Page &[Page]". The &[Date] and &[Page] functions instruct EXCEL® to substitute the current date and current page number. Click **OK** .
21. Select **Custom Footer**. In the center section, type in "ISAT 151". Highlight the text ISAT 151. Click on the **A box**. Change the font **Size**: to 12 and click **OK**. **SAVE YOUR WORK!**
22. Now print the spreadsheet with the embedded chart to be turned in. To do that, click anywhere on the spreadsheet to select it (NOT on the chart) and hit the **Print** hot key, or from the **Main Menu** select **File/Print...** and hit **OK**. You may preview your output using **File/Print Preview** or the Print Preview hot key. See the attached picture of the EXCEL® screen to locate the Print and Print Preview hot keys.
23. To format the chart for printing, click anywhere on the chart to select it. From the **Main Menu**, select **File/Page Setup...** Note that instead of a **Sheet** tab, there is now a **Chart** tab. Under the **Chart** tab, try the different **Printed chart size** options to see how each alters the format of the printed chart. Select **Custom**. Under the **Margin** tab, make all the margins 1" and center the chart vertically and horizontally. Under the **Page** tab, select **Landscape**. Format the header and footer as in 19-20 above. Click **OK**. Print out a copy of the chart only to be turned in.

NOTE THAT FORMATTING THE CHART ALONE FOR PRINTING DOES NOT ALSO FORMAT THE SPREADSHEET CONTAINING THE EMBEDDED CHART FOR PRINTING. They need to be formatted separately for printing.

PROCEDURE PART II: TRENDLINE ANALYSIS

1. Go to Sheet 2 of your spreadsheet. Enter the data below into your spreadsheet by highlighting the data and pasting into cells A2-B12.

-5	23.5
-4	12
-3	5
-2	1
-1	0.62
0	0.49
1	0.51
2	1.25
3	5
4	16
5	41

2. In cell A1 put the letter "t." In cell B1, put "f(t)." Center-justify and bold the contents of cells A1 and B1. Center-justify the contents of cells A2-B12. **SAVE YOUR WORK!**
3. Highlight the contents of cells A1-B12. Open Chart Wizard. Make an **XY Scatter** plot using the **Sub-chart** with the points only. Eliminate the legend and the gridlines. Title the chart "Graph of Velocity vs. Time of Particle." Make the x axis read "Time(secs)" and the y axis read "Velocity(m/s)." Embed the chart beside the data and make it as big as possible (from column C to column N and down to row 33 or so). Make the data points font size 8 and the color of the points dark blue.
4. Format the x axis: Leave the **Minimum:** and the **Maximum:** as the default, but make the **Major unit:** 1 and the **Minor unit:** 0.5. Make the minor tick marks show inside. Make the font size of the axis labels 10.
5. Format the y axis: Leave the **Minimum:** and the **Maximum:** as the default, but make the **Major unit:** 5 and the **Minor unit:** 1. Make the minor tick marks show inside. Notice that the Maximum automatically adjusts to accommodate the new major units. Make the font size of the axis labels 10.
6. To do a trendline or "best fit" analysis of the data points, right click on any one of the data points. Select **Add Trendline...** In the **Type** tab, select **Polynomial** as the function type and leave the degree of the polynomial as **2**. Click on the **Options** tab. Put a check in the boxes **Display equation on Chart** and **Display R-squared value on chart**. Hit **OK**. A "best fit" line will appear on your chart and the equation of the "best fit" function will be displayed, along with the R^2 value for that fit. Note the magnitude of the R^2 value and

qualitatively evaluate the “goodness of fit” by visual inspection. Do you think this is a good fit? Why or why not?

7. Right click on one of the data points again. Select **Add Trendline...** In the **Type** tab, select **Polynomial** as the function type and change the degree of the polynomial to **5**. In the **Options** tab, display the equation and the R^2 again and hit **OK**. Note the magnitude of the R^2 value and visually inspect the goodness of fit. How does this compare to the result in Step 6? (Please note: this fitting exercise is for example purposes only as fitting points to a 5th degree polynomial is not generally an acceptable thing to do in real modeling situations.)
8. Delete the best fit from step 6 by highlighting the trendline and deleting it. This also deletes the equation of that trendline. Right click on the 5th degree trendline and select **Format Trendline...** Make the trendline red and hit **OK**.
9. Manually edit the variables in the “best fit” equation by successively highlighting all the occurrences of “y” and “x” and replacing them with “f(t)” and “t” respectively.
10. Right click on the equation and select **Format Data Labels...** Click on the **Font** tab and make the font size of the equation 10. Hit **OK**. Re-position the equation by selecting the equation and then holding the pointer at the edge of the box. When the arrow appears, move the equation directly under the chart title. Move the chart itself lower if necessary to get the equation to fit nicely.
11. Format both the chart and the entire spreadsheet for printing. Make the orientation of the output **Landscape** and make the output **Fit to 1 page(s) wide by 1 page tall**. Make the four margins 1” each. Center the output vertically and horizontally by checking the appropriate boxes. Do *not* use gridlines in your printout.
12. Click on the **Header/Footer** tab and select *Prepared by your name and today’s date, Page 1*. Make a custom footer with ISAT 151 of font size 12. **SAVE YOUR WORK!**
13. Print a copy of the entire spreadsheet with the embedded chart to be turned in.