

Microsoft Excel Lab: Weighted Grade Evaluation

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Concept of Weighted Averages (Background Information)

Performance in a course is evaluated by assigning weights that reflect the importance of each aspect of the course towards the overall course goals. These weights are used in computing overall course grades. For example, a syllabus might specify the following weights for different categories of performance:

- Final Exam 20%
- Major Exams 40%
- Quizzes 10%
- Homework 10%
- Lab 20%
- Total 100%

Suppose your averages in each category are: Final Exam = 80%, Major Exams = 70%, Quizzes = 50%, Homework = 100%, Lab = 95%. Your final grade would be computed by multiplying each average times the associated weight, and summing the results.

Category	Weight	Grade	Weighted Score
Final Exam	20%	80	16.0
Major Exams	40%	70	28.0
Quizzes	10%	50	5.0
Homework	10%	100	10.0
Lab	20%	95	19.0
		Total	78.0

It is possible to weight scores within each category, such as homework. This makes sense. Some homework assignments are more difficult or more important than others. Suppose you have 3 homework assignments. Together, these make up 10% of your overall grade. Suppose Homework #1 is worth 2%, Homework #2 is worth 5%, and Homework #3 is worth 3%. The table can be generalized to accommodate these individual assignment weights. Suppose your homework scores are HW #1 = 50%, HW #2 = 100%, HW #3 = 90%. Other scores are as recorded earlier. Here are the results.

Category	Category Weight	Item	Item Weight	Grade	Weighted Score
Final Exam	20%		20%	80	16.0
Major Exams	40%		40%	70	28.0
Quizzes	10%		10%	50	5.0
Homework	10%	HW #1	2%	50	1.0
		HW #2	5%	100	5.0
		HW #3	3%	90	2.7
Lab	20%		20%	95	19.0
				Total	76.7

The lab that follows will give you the experience in setting up a grade sheet. You can use this for all your classes. Start a new spreadsheet for each class.

Introduction to Lab Procedure

This is a simple first exercise in using Excel. You will use formulas on a spreadsheet to compute grades. You will add headers and format labels. You will print the spreadsheet and the formula sheet.

Cell Reference Notation: (Information) Cells in a Microsoft Excel Spreadsheet are referenced in one of two ways. One way is by a column letter and a row number. For example, cell D5 is the cell located at the intersection of column D and row 5. **Relative** cell references will change if you drag the formula to a new cell. A **relative** cell reference does not have a dollar sign in front of it, such as D5. An **absolute** cell reference will not change if you drag the formula to a new cell. An absolute cell reference has a dollar sign using forms such as D\$5, \$D5, and \$D\$5. In the example of D\$5, the reference to column D is a relative reference, and the reference to row 5 is an absolute reference. A cell reference *in a macro* uses row and column numbers, such as cells(5,4), which refer to the cells(row,column).

Notation (Information)

The vertical bar notation “File | Save As” or “File | Properties” is used to indicate a sequence of commands or menu choices. For example, “Format | Cells... | Number | Number | Decimal places = 2” means

- Click on the “Format” menu
- Select the “Cells...” submenu
- Select the “Number” tab
- Select the “Number” entry from the selection list
- Set “Decimal places” equal to “2”

Before Starting Excel (Information)

To do this lab, you must have access to your H drive. Be sure that you log on to your account under both NT-4 and UNIX.

Initialize File (Procedure)

1. Start Microsoft Excel.
2. Select Cell A1. Enter your name.
3. Save the empty file to set up preserving your work periodically.

File | Save As

In the “Save in:” list box, select the directory to save your work on the H drive: H:\CSC100\Excel.

In the “File name:” edit box, enter the name “Excel Weighted Grade Evaluation”.

Click the “Save” button in the “Save As” dialog box.

4. Enter documentation into the Properties Sheet. File | Properties

Title: Excel Weighted Grade Evaluation


Subject: Weighted grade computation

Author: Enter your name.

Company: Enter your military unit, business, church, organization, or school name.

Comments: Use formulas to compute course grade.

Click the “OK” button in the Properties dialog box.

- Click the SAVE icon. This is the 3rd icon on the Standard Toolbar. It looks like a floppy disk. 

Throughout this assignment, you should click the SAVE icon about every 5 minutes, and after finishing each major section of this assignment.

Sample Spreadsheet (Information)

Your Name

Category	Category Weight	Item	Item Weight	Grade	Weighted Score
Final Exam	20%	Final Exam	20.0%	70.0	14.00
Major Exams	40%	Exam #1	10.0%	60.0	6.00
		Exam #2	10.0%	70.0	7.00
		Exam #3	10.0%	80.0	8.00
		Exam #4	10.0%	75.0	7.50
Quizzes	10%	Quiz #1	2.0%	70.0	1.40
		Quiz #2	2.0%	80.0	1.60
		Quiz #3	2.0%	75.0	1.50
		Quiz #4	2.0%	85.0	1.70
		Quiz #5	2.0%	91.0	1.82
Homework	10%	HW #1	0.5%	50.0	0.25
		HW #2	0.5%	75.0	0.38
		HW #3	1.0%	100.0	1.00
		HW #4	1.0%	100.0	1.00
		HW #5	1.0%	80.0	0.80
		HW #6	1.0%	50.0	0.50
		HW #7	1.0%	0.0	0.00
		HW #8	0.5%	80.0	0.40
		HW #9	0.5%	50.0	0.25
		HW #10	0.5%	100.0	0.50
		HW #11	0.5%	75.0	0.38
		HW #12	0.5%	80.0	0.40
		HW #13	0.5%	80.0	0.40
		HW #14	0.5%	100.0	0.50
		HW #15	0.5%	50.0	0.25
Lab	20%	Lab #1	2.0%	25.0	0.50
		Lab #2	2.0%	50.0	1.00
		Lab #3	2.0%	80.0	1.60
		Lab #4	2.0%	95.0	1.90
		Lab #5	2.0%	80.0	1.60
		Lab #6	2.0%	80.0	1.60
		Lab #7	2.0%	95.0	1.90
		Lab #8	2.0%	50.0	1.00
		Lab #9	2.0%	75.0	1.50
		Lab #10	2.0%	80.0	1.60
Total:					71.72

When you finish your project, it should look like the sample above. **Do not type in all the numbers. Follow the procedure.** Use of copy features and formulas greatly reduces the time and effort needed.

Sample Syllabus Grading Plan (Information)

For the purpose of this lab, assume your course syllabus specifies the following plan for weighting grades. Unless otherwise specified, assume that within each category that equal weight is given for each assignment.

Final Exam: Category Weight: 20%.

Exams #1 – 4: Category Weight: 40%.

Quizzes #1 – 5: Category Weight: 10%.

Homework: #1 – 15: Category Weight: 10%. Item Weights: HW #3 – 7: 1% each. All others: 0.5%.

Labs #1 - 10: Category Weight: 20%.

Create Structure of Spreadsheet (Procedure)

Enter Column Heading Labels

Enter **labels** into cells as given in the sample spreadsheet.

To create a new line within a cell, use **Alt + Enter**.

6. Enter column headings in row 2, beginning in column A.

Category	Category Weight	Item	Item Weight	Grade	Weighted Score
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Enter Major Category Row Headings

7. Enter major category headings into column A with corresponding weights in column B.

Final Exam	20%
Major Exams	40%
Quizzes	10%
Homework	10%
Lab	20%

Insert Rows for Individual Assignments

Rows are selected by clicking on the gray row numbers in the left column of the spreadsheet.

To insert a new row:

- Immediately below where you want the new rows, select (highlight) the number of rows you want to insert.
 - For example, to insert 3 rows below Row #4 (Major Exams), select 3 rows below Row #4. There are rows numbered 5, 6, and 7.
- Insert the new rows by: Insert | Rows.
 - Continuing the example from the previous step, three new blank rows will appear below Row #4.

Insert blank rows between categories to accommodate each individual assignment. The first row in each category is also used as a row for an individual assignment. The number

of new rows needed in a category is one fewer than the total number of assignments in that category. For example, there are 15 homework assignments, so 14 new rows need to be inserted in the homework category.

8. Insert 3 new rows under Major Exams
9. Insert 4 new rows under Quizzes.
10. Insert 14 new rows under Homework.

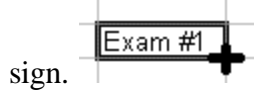
Notice that all the remaining spreadsheet rows below Labs are blank. We therefore do not need to insert more blank rows to accommodate the labs.

Enter Labels for Individual Assignments

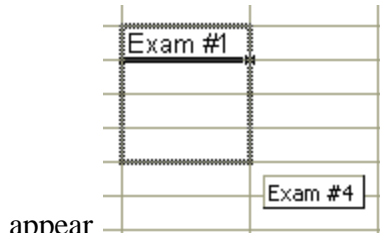
Enter a Sequence of Labels

To enter labels with a number at the end that increases:

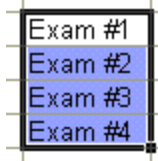
11. Enter the first label, such as **Exam #1** in column C, row 4. Press **Enter**. Notice that after pressing Enter, a new cell is selected. You will need to reselect the cell you just finished working on.
12. Select the cell with the label you just entered.
13. Place the mouse cursor on top of the small black square box in the lower right corner of the selected cell. The mouse cursor will change shape to a bold plus-



14. Use the left mouse button and drag the corner of the box down. A note tag will



appear after you start dragging to display the value to be



entered into the new cell when you release the mouse button.

Enter Remaining Assignments

15. Using the procedure above, enter labels for
 - a. Quiz #1 through Quiz #5
 - b. Homework #1 through Homework #15
 - c. Lab #1 through Lab #10


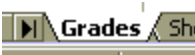
Format the Assignment Labels

16. Select and bold the row and column labels.

To make a selected cell bold, click on the Bold button **B** on the formatting toolbar.

Name the Spreadsheet

17. Name the spreadsheet by entering its name on the tab at the bottom of the spreadsheet, using the following procedure:

- a. Double-click on the tab at the bottom of the spreadsheet. The label will be highlighted. 
- b. Enter the label “Grades”.
- c. Press “Enter”. 

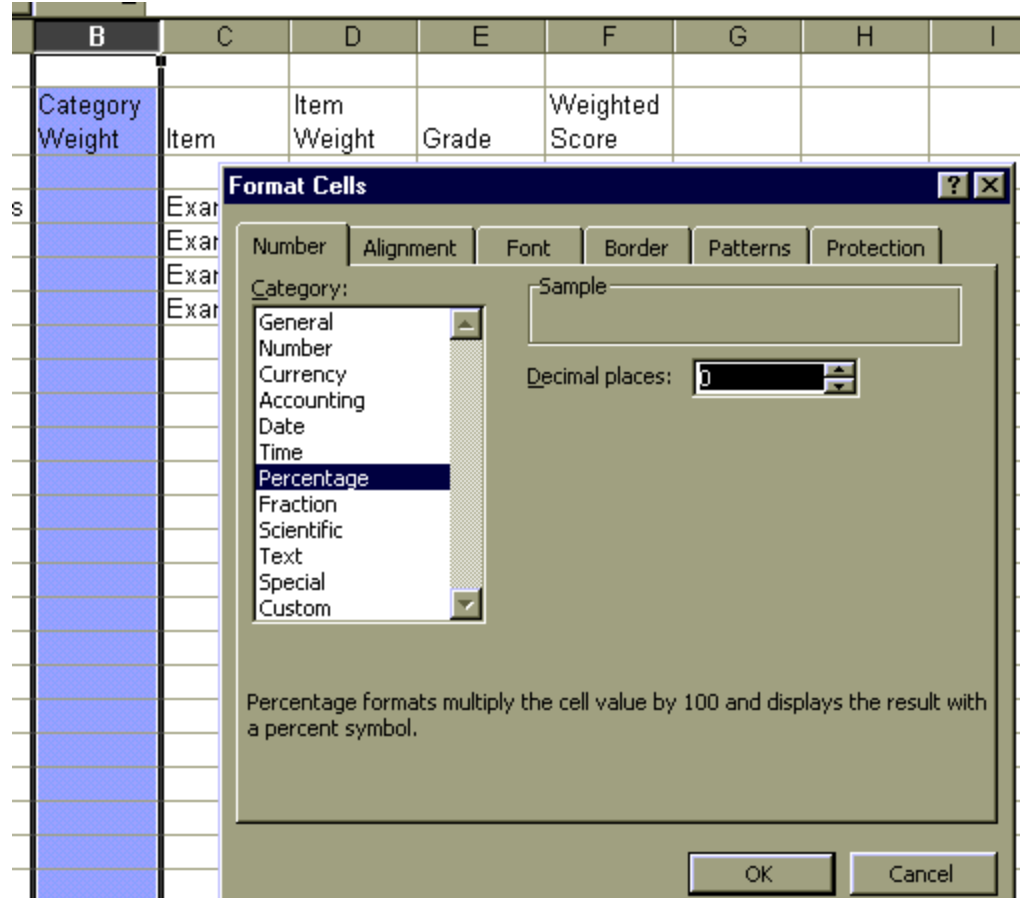
Specify the Number Format for Columns

To select a whole column, click on the column label in the gray area at the top of the column.

- 18. Format Column B to be **Percentage** with 0 decimal places. In abbreviated notation, the procedure is:

Format | Cells... | Number | Category | Percentage | Decimal places = 0.

- a. Select column B.
- b. On the Format menu, select: Format | Cells. In the “Format Cells” dialog box, on the “Number” sheet, in “Category”, select “Percentage”.
- c. In the “Decimal places” edit box, use the down arrow to select zero if it is not already zero.
- d. Click the “OK” button on the Format Cells dialog box.



- 19. Format Column D to **Percentage** with 1 decimal place. This is:

Format | Cells... | Number | Category | Percentage | Decimal places = 1.

- a. Select column D.
 - b. On the Format menu, select: Format | Cells.
 - c. In the “Format Cells” dialog box, on the “Number” sheet, in “Category”, select “Percentage”.
 - d. In the “Decimal places” edit box, use the down arrow to select 1 if it is not already 1.
 - e. Click the “OK” button on the Format Cells dialog box.
20. Format Column E to **Number** with 1 decimal place. This is:
Format | Cells | Number | Category | Number | Decimal places = 1.
- a. Select column E.
 - b. On the Format menu, select: Format | Cells.
 - c. In the “Format Cells” dialog box, on the “Number” sheet, in “Category”, select “Number”.
 - d. In the “Decimal places” edit box, use the down arrow to select 1 if it is not already 1.
 - e. Click the “OK” button on the Format Cells dialog box.
21. Format Column F to Number with 2 decimal places. This is:
Format | Cells... | Number | Category | Number | Decimal places = 2.
- a. Select column F.
 - b. On the Format menu, select: Format | Cells.
 - c. In the “Format Cells” dialog box, on the “Number” sheet, in “Category”, select “Number”.
 - d. In the “Decimal places” edit box, use the down arrow to select 2 if it is not already 2.
 - e. Click the “OK” button on the Format Cells dialog box.

Enter Grade Weights

To enter percents, be sure to use the % sign after the number.

22. Look at the Category Weight and Item Weight columns in the Sample Spreadsheet.

The Category Weight is entered only once beside the category name.

The Item Weight is entered next to each item. The idea is that the percentage next to the Category Weight is being distributed among the individual items within that category.

23. Enter the following weights in the appropriate columns.
- a. Final Exam: Category Weight: 20%. Item Weight: 20%.
 - b. Exams #1 – 4: Category Weight: 40%. Item Weight: 10% each.
 - c. Quizzes #1 – 5: Category Weight: 10%. Item Weight: 2% each.
 - d. Homework: #1 – 15: Category Weight: 10%.
 1. HW #3 – 7: Item Weights 1% each.
 2. All others: Item Weights 0.5%.
 - e. Labs #1 - 10: Category Weight: 20%. Item Weights: 2% each.

Formulas for Computing Grades (Information)

Basic Idea

Two formulas are needed. One formula is used to compute the weighted grade for a particular assignment. The other formula is to compute the sum of all the weighted grades to get the cumulative grade.

The first formula will be copied, not reentered, for each assignment. This is a major work-saving benefit of using a spreadsheet program.

Enter a Formula for Assignment Weighted Score (Procedure)

Use the following procedure to enter the formula for multiplying **Item Weight** times **Grade** to get **Weighted Score**.

24. Select cell F3.
25. Place your mouse cursor over the equal sign = in the formula bar above the spreadsheet. A note tag will appear to identify the equal sign as "Edit formula".



26. Click on the equal sign.

A message box will appear with the label "Formula result =". It may be hiding column labels you want to look at.

27. Drag the message box out of the way.
 - a. Place your mouse cursor on a blank area of the message box.
 - b. Using the left mouse button, drag the panel to a new location.
28. Click cell D3. This inserts a reference to D3 (Item Weight) in the formula edit box.
29. Push the asterisk * button on the numeric key pad. The asterisk is used as the symbol for multiplication.

Num Lock	/	*	-
7 Home	8 ↑	9 Pg Up	+
4 ←	5	6 →	
1 End	2 ↓	3 Pg Dn	Enter
0 Ins	.	Del	

30. Click cell E3. This inserts a reference to E3 (Grade) in the formula edit box.
31. Click "OK" in the formula message box (the message box you moved). Cell F3 will contain a zero because no grade has yet been entered.

Copy Formula to Other Assignments

32. Drag the formula in F3 down to define formulas for all other items.
 - a. Select cell F3.

- b. Place the mouse cursor on top of the small black square box in the lower right corner of the selected cell. The mouse cursor will change shape to a bold plus-sign.
- c. Use the left mouse button and drag the corner of the box down to cell F37. The vertical display on the monitor might not display your starting and stopping point.
- d. Drag the formula to cell F27.
- e. Use the vertical scroll bar to scroll down until cells F27 and F37 are both visible.
- f. Continue dragging the formula down to cell F37.

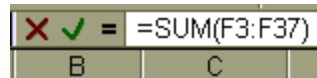
Enter Formula for Sum

33. Enter the formula for the sum. This sum is your cumulative course score. By the end of the course, you want this number to equal 100.

- a. Select cell F38.
- b. On the Standard Toolbar, select the summation button, Σ .



The formula SUM(F3:F37) will appear in the formula



edit box.

- c. Press the Enter key.

34. Label the total.

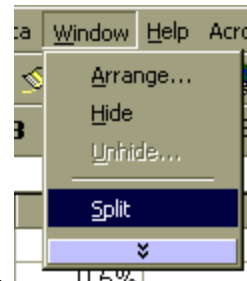
- a. Select cell E38.
- b. Click on the Bold button in the formatting toolbar.
- c. Enter the label **Total:**.

Entering Grades

Split the Worksheet

The total course cumulative score is at the bottom of the spreadsheet. To view the effect of new grades on the total score as you enter data, split the worksheet using the following procedure.

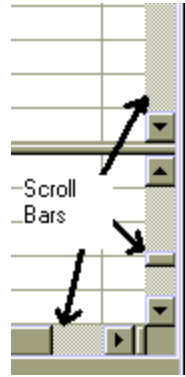
- 35. Scroll to the top of the spreadsheet.
- 36. Select cell A24.



37. On the Window menu, select "Split".

A split bar will partition the window into an upper and a lower part.





Each partition has its own vertical scroll bar.

38. Use the scroll bar in the lower partition to scroll down until the **Total** label is visible in row 38.
39. Use the upper partition vertical scroll bar to adjust the spreadsheet while you enter data.

Enter Grades

The grades below are presented in the order that they might be received over time during a course. This part of the exercise will demonstrate the effect of entering new grades on a cumulative score.

40. Enter the following grades in the upper partition.
 - a. HW #1: 50; HW #2: 75; Lab #1: 25, Quiz #1: 70.
 - b. HW #3: 100; Lab #2: 50; HW #4: 100; Lab #3: 80, Quiz #2: 80.
 - c. Exam #1: 60
 - d. HW #5: 80; Lab #4: 95; HW #6: 50; Lab #5: 80, Quiz #3: 75.
 - e. HW #7: 0; HW #8: 80; Lab #6: 80
 - f. Exam #2: 70
 - g. HW #9: 50; Lab #7: 95; HW #10: 100; Lab #8: 50, Quiz #4: 85.
 - h. HW #11: 75; HW #12: 80; Lab #9: 75
 - i. Exam #3: 80
 - j. HW #13: 80; Lab #10: 80; HW #14: 100; Quiz #5: 91.
 - k. HW #15: 50
 - l. Exam #4: 75
 - m. Final Exam: 70

If you got all the formulas right, the total should be 71.72

Page Setup and Print Spreadsheet

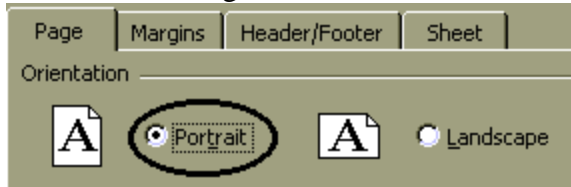
Format the spreadsheet, including headers and footers, to identify the content, the owner, and when it was prepared.

41. On the File menu, select Page Setup.

Select Page Orientation

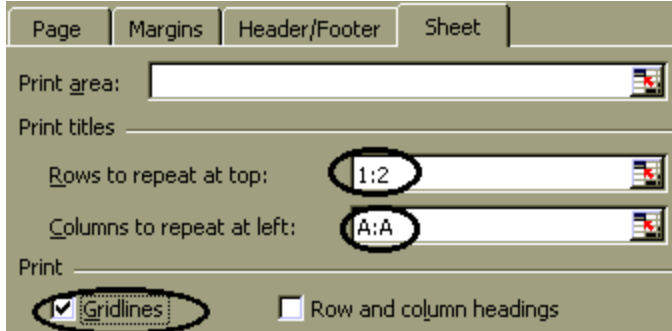
42. In the Page Setup dialog box, On the “Page” tab, under “Orientation”, select “Portrait”. (Usually, “Landscape” is a better choice for printing wide tables. This

table for this assignment is narrow, so Portrait is satisfactory.)



Select Page Formatting for Spreadsheet Content



43. On the “Sheet” tab, in the “Print titles” section, and the “Rows to repeat at top:” edit box, enter 1:2. This will cause rows #1 and 2 labels to print on additional sheets of output if more than one page is needed.



44. On the “Sheet” tab, in the “Print titles” section, and the “Columns to repeat at left:” edit box, enter A:A. This will cause column “A” labels to print on additional sheets of output if more than one page is needed. Be sure to use the colon between the two letters.
45. On the “Sheet” tab, in the “Print” section, checkmark the “Gridlines” box. This will cause light lines to appear on the printed spreadsheet. This is helpful in guiding the eyes when reading a table of numbers.





Setup Header and Footer

Header


46. On the “Header/Footer” tab, select “Custom Header...”.
47. In the “Header” dialog box, click in the “Left section:” edit box. Type your name in this box.
48. In the “Header” dialog box, click in the “Center section:” edit box. Click on the “File” icon.  It looks like a blank sheet with the upper right corner bent, and with a green X centered on the left edge. This enters the code “&[File]” into the edit box. This causes the name of the file to appear centered in the header of the output.
49. In the “Header” dialog box, click in the “Right section:” edit box. Click on the “Tab” icon.  It looks like a set of 3 file folders on top of one another with the tabs at the bottom. This enters the code “&[Tab]” into the edit box. This causes the name of the spreadsheet sheet to appear in the right section of the header of the output.
50. Click the “OK” button on the Header dialog box.

Footer


51. On the “Header/Footer” tab, select “Custom Footer...”.
52. In the “Footer” dialog box, click in the “Left section:” edit box.

53. Click on the “Date” icon.  It looks like a set of 2 pages from a calendar. This enters the code “&[Date]” into the edit box. This causes the current date of the spreadsheet sheet to appear in the footer of the output.
54. Click on the “Time” icon.  This causes the current time of the spreadsheet to appear in the footer of the output.
55. In the “Footer” dialog box, click in the “Center section:” edit box.
56. Click on the “Page Number” icon.  It looks like a sheet with the upper left corner bent and a pound sign # in the center. This enters the code “&[Page]” into the edit box. This causes the name of the spreadsheet sheet to appear centered in the footer of the output.
57. Press the spacebar and enter the word “of”, and press the spacebar again.
58. Click on the “Total Pages” icon.  It looks like a sheet with the upper left corner bent, and two plus-signs on the sheet. This enters the code “&[Pages]” into the edit box. This causes the total number of pages to appear centered in the footer of the output.
59. Click the “OK” button in the “Footer” dialog box. Notice that the “Page Setup” dialog box displays a preview of the headers and footers.
60. Click the “OK” button in the “Page Setup” dialog box. Notice that a dotted line appears on the spreadsheet. The area within these lines will print on one page.

Print Preview

61. View the planned output by pressing the “Print Preview” icon  on the Standard Toolbar. This icon looks like a blank sheet with the upper right corner bent, with a magnifying glass along the right edge.

Print the Spreadsheet.

62. Use the “Print” icon  on the Standard Toolbar. It looks like a printer with a sheet of paper coming out of the top.

Print Formula Sheet

Preparation: The “left single quote” key is the on the typing keyboard to the left of the “1” key.

63. Select the formula sheet view using the following procedure.

- a. Press “**Ctrl** + {left single quote}”. This acts as a toggle switch. It causes the display to switch back and forth between the normal spreadsheet view and the formula sheet view. Each time you press this key combination, the view swaps.

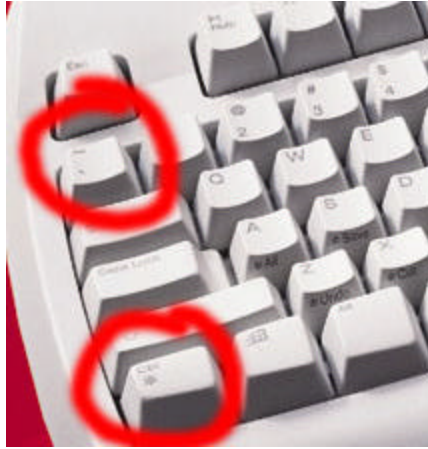


Figure 1. Ctrl + Left Single Quote.¹

- b. You should see formulas in column F.
64. View and print the Formula View output.
 - a. Use “Print Preview”. The formula sheet takes up more than one page. Notice that a button labeled “Next” appears at the left end at the top of the print preview screen.
 - b. Press “Next” to see the second page. You should see the labels of column “A”, and the right-most column should be the column of formulas.
 - c. Press the “Print” button at the top of the “print preview” screen.
 - d. Click the “OK” button in the “Print” dialog box.
 65. Return to the normal spreadsheet view by again pressing “Ctrl + {left single quote}”.
 66. Save the Excel file.
 67. Exit Excel.

¹ Illustration by Joshua B. L. Caldwell, 03 June 2003.