

# Working Spreadsheets

Revision 1.2

Basic Training in Computer Science™

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Revised by Jordan Nash.

**Adult Life Training, Inc.**

*An Indiana Not For Profit, Community Benefit, Educational Corporation*

Affiliated with

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## Foreword

This book is written to help you, the beginning computer user, build your first computer job skills. This book is designed to be used as a step-by-step guide during your practice time outside of class. In class we use Linux, and you will notice most things work the same, with a very few differences. This text is written specifically to fit the Microsoft-type systems because at this point in time they are still the kind you are most likely to encounter at home or in the library.

We have come a long way from where we started some years ago. We have helped several hundred people and in this revision we have applied that experience to update this text accordingly. This revision is the first to have an instructor's version available.

You can use this book as a beginning for your computer self-help collection. I hope this helps!

John Nash, President  
Adult Life Training, Inc.

### Disclaimer

By using this manual you indicate that you understand and agree that this manual is not to be construed as professional advice. Seek the appropriate professional practitioner for professional advice.

## Acknowledgments

We would like to thank everyone who contributed to this project: our Fort Wayne community that made room for us to serve, Abundant Life Tabernacle that provides the space for our office and lab, AEP and Abundant Life Christian Academy that provides the lab computers, and the Indiana Department of Workforce Development that sends us many of our students.

We also thank Pastor Keller and David Stovall for their continued encouragement and patience, Jordan Nash who most recently edited some of our work and has provided much technical help in the lab, Jerrod Nash for his technical help in the lab, Jennifer Nash who has helped with the elementary and middle school material we teach and filled in on the telephones more than once, and my patient and loving wife Jolene who has been supportive in so many ways. Starting a business is stressful for a family, but serving our community as an unfunded not for profit, with no salary income for three years, creates even more stress. We appreciate your contributions to this important work.

But over and above all these, we would like to thank God, who as Jesus Christ gave us a reason to live, and through His Spirit living in us today makes this work possible. He has and is still sustaining us when all worldly wisdom says that we should have been defeated, bankrupt, and disappeared homeless years ago. By His Grace alone we continue even today.

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## How to use this document

This document is intended to be used in instructor led classroom instruction with a computer and OpenOffice for each student. It may also be used by the student for practice. OpenOffice is produced by Sun Microsystems in California, is free, and works with Linux and Microsoft systems.

## Goals for this module

This is a novice level module to help someone who has no experience with spreadsheet programs. The module is intended to be generic enough to apply to most existing spreadsheet programs including Sun Microsystem's OpenOffice and Microsoft's Office products.

When you have successfully completed this module, you should be able to:

1. Start the spreadsheet program
2. Identify a cell by its column-row designation and other spreadsheet fundamentals
3. Use the spreadsheet for documentation purposes, such as to create a department telephone list. This includes:
  - Entering words or phrases into cells
  - Merging the cells of a title line so that they cover the top of the list nicely
  - Editing a cell's contents by using the formula box, pressing F2, or double clicking.
  - Formatting the cell's contents (Bold, Italics, colors, and so forth)
  - Typing words into columns, such as a list of names
  - Sorting the words in the columns in various useful ways, such as by name, department, or zip code.
  - Printing the spreadsheet
4. Use the spreadsheet for numerical analysis purposes, such as a loan amortization schedule, that uses formulas. This includes:
  - placing titles appropriately
  - entering formulas into individual cells by typing and/or clicking.
  - Fixing the references in formulas so that they do not change as the formula is copied to sequential rows
  - Finding the answer to a problem by changing the inputs until a desired condition is achieved, such as changing the amount of a monthly loan payment until the loan is exactly paid off at the end of its term.
5. Use the spreadsheet for Presentation purposes, such as collecting and presenting Quarterly Regional Sales Figures. This includes:
  - placing titles appropriately
  - entering formulas into individual cells by typing and/or clicking.
  - Entering sales numbers by sales person into each region's sheet
  - summarizing all regions total sales on one "summary" sheet
  - graphing the sales in various charts on the summary sheet
6. Save the spreadsheet to disk and diskette in different file formats, such as OpenOffice 1.0 format or Microsoft Excel 95 format, and understand why the file format matters.
7. Close the program.

## Prerequisites

This class is intended to teach by instruction and practice how to operate a spreadsheet program, such as Sun Microsystems's OpenOffice Spreadsheet or Microsoft's Excel. Before taking this class you should have mastered the beginners class material and completed the Formatting Text module CS 6.0.

## Background

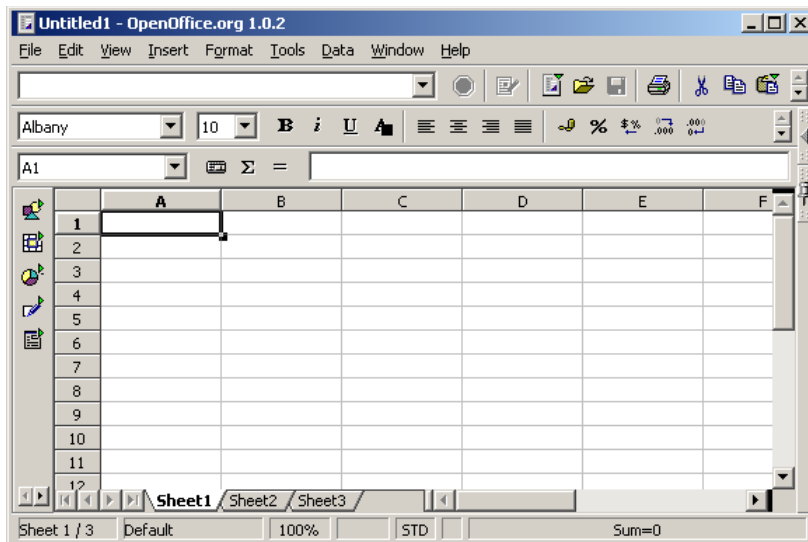
Spreadsheet programs display a grid of “cells” that can hold words or numbers and relate to each other. Each cell can hold a formula that depends upon what is in other cells, which can also hold formulas. A spreadsheet can be used for anything from complex calculations to simple telephone directory. Learning how to use a spreadsheet is one of our students most frequent requests.

In this course we will be using OpenOffice. This is a robust office suite that is also very similar to the other popular office suite, Microsoft Office. Both work in very similar ways but the OpenOffice programs are free. You can buy a copy of OpenOffice at many local office supply and computer stores for a nominal price or download it for free from <http://www.openoffice.org>. You can buy Microsoft Office at many office supply and computer retail stores.

# Spreadsheet Basics

## 1. Overview

When you first look at a spreadsheet program, you will notice most obviously that it is a grid of rows and columns. The columns are lettered (A, B, C, ...) across the top and the rows are numbered down the left edge (1, 2, 3, ...). There is a small rectangle for each column, row combination, called a *cell*. A Spreadsheet is composed of cells.



Each cell is an independent entity that can hold words, numbers, or a formula that incorporates the values in other cells.

## 2. Cell Names

Each cell is named by its column, row coordinates. Cell A1 is in the upper left corner, B1 is immediately to the right of A1, A2 directly under A1 and so forth.

## 3. Cell Editing

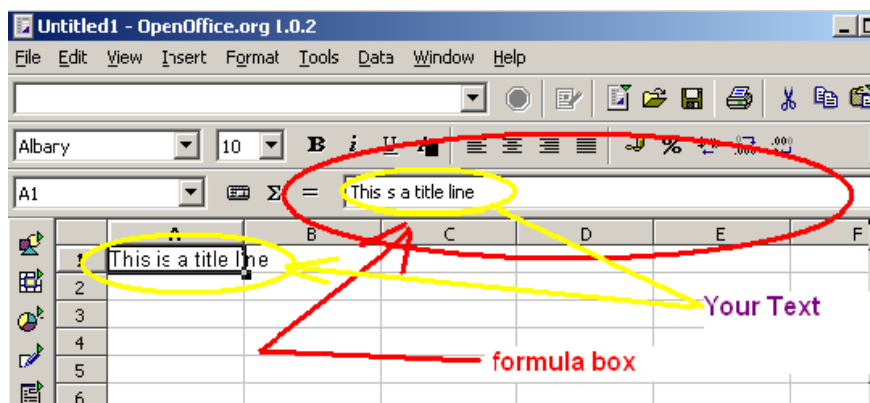
Click on cell A1. Type in the phrase “This is a title Line.” Note that the words appear in the cell as you type and spill over into the next cell to the right, B1, as you type. When you press enter, the cursor moves down to cell A2.

Click on A1 again to highlight it. Type “My Phone List,” but DO NOT press enter yet. Notice that what you had in A1 before immediately began to be replaced by what you were typing. Now press ESCAPE. Notice that the cell is restored to its previous condition. Pressing ESCAPE before you leave a cell by pressing ENTER or an arrow key, or by clicking in another cell, will undo whatever change you were making.

Click on A1 again to highlight it. Type “My Phone List” and press ENTER. The cell contents change. Now press control Z by holding down either control key and pressing and releasing the Z key. We will sometimes denote control characters as a hat character, read “control”, followed by the letter, thus



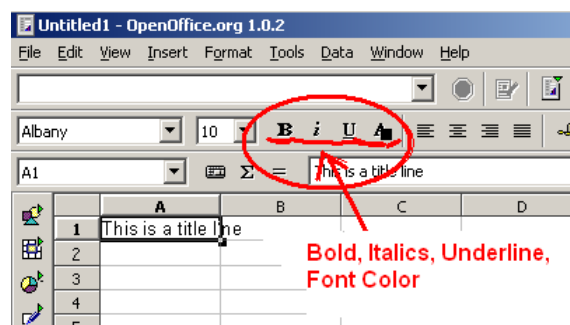
control Z is typed herein as “^Z”. Notice that the change you made to A1 has been undone again. Control Z will UNDO a limited number of changes even after you press return. If you make a mistake, do not go nuts trying to undo it yourself. Just press ^Z immediately. If you make too many more motions after the mistake, you may not be able to fix it with ^Z!



To begin editing a cell you may also double click, press F2, or simply type the changes in the FORMULA box above the columns. The formula box shows what is actually in the active (selected) cell.

#### 4. Formatting Text

Click on A1 again. Now Note the **B**OLD, *i*TALICS, UNDERLINE, and FONT COLOR (A with a square after it) icons in the tool bar above the column letters. Press the **B** (Bold) tool button.



Notice that the contents of A1 is bolded. Press the Italic button. Notice your text is now italicized. Press the Italic button again. Notice that now the text is not italicized. Try the underline button also. These buttons toggle back and forth as you press and release them. On the keyboard try Ctrl-B, Ctrl-U, and Ctrl-I.

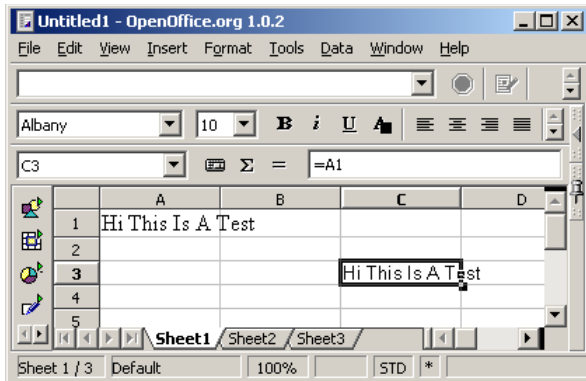
The font color button allows you to select a color for the font. Press the button on the tool bar to get the color chart. Click a color on the chart to make your selection. Remember ^Z will undo. More formatting choices can be made under the Format menu item.

#### 5. Entering Formulas

A formula allows you to enter more complex instructions as to what the cell should show. A spreadsheet formula looks similar to an algebraic formula. You can see the formula in the formula box above the column headings.

### Simply copying a cell's contents

To enter a formula, begin by pressing the Equal sign. Then type the formula. If you wanted a formula in cell C3 that displays a copy of what is in cell A1, then you would click on cell C3 and then type =A1 and press ENTER. C3 would then show whatever is in A1, and when A1 changes C3 will change to match. Type the words “Hi This Is A Test” in cell A1, then click on C3. Type “=A1” and press ENTER.

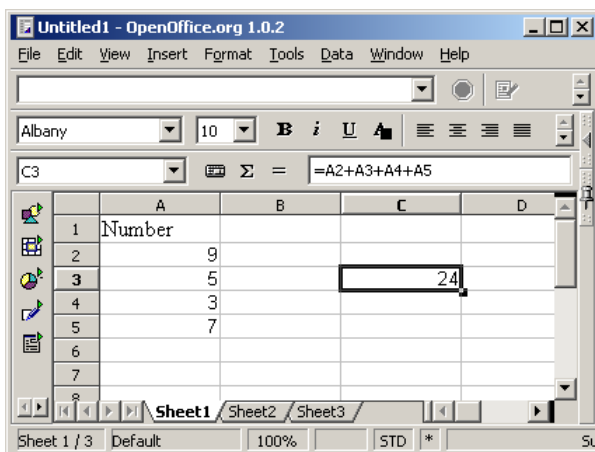


Change the words in A1 and watch what happens in C3. Double click A1 and arrow over to the word Test. Insert the word “only” in front of the word “test” so your message reads “This is only a test”. Press Enter. Notice C3 changed to match whatever you typed in A1.

This feature is handy when the cell you want to see is inconveniently located in the spreadsheet and you want a copy that you can easily see near the top.

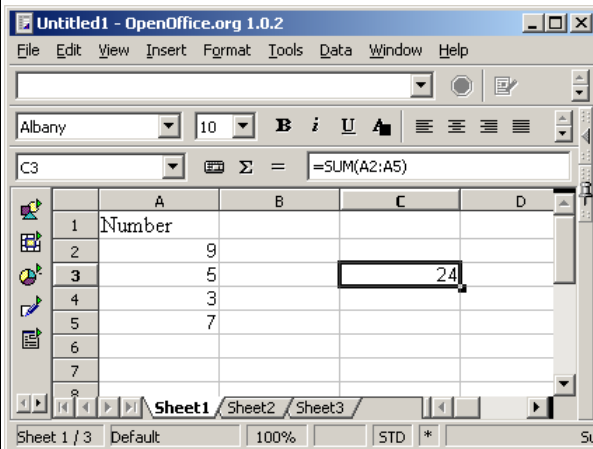
### Totaling a column of numbers

If you want to show the total of several cells, then you can type them in also as a formula. Suppose that in cell C3 you want to enter a formula that shows you the total of the numbers in cells A2, A3, A4, and A5. When any or all of the numbers in cells A2 through A5 change, the total in cell C3 will change to match. Type numbers into cells A2 through A5, then click on cell C3. Type =A2+A3+A4+A5 and press ENTER to lock in the formula. Change some of the numbers in A2 through A5 and watch C3. You can see what I have typed into cell C3 in the formula box.

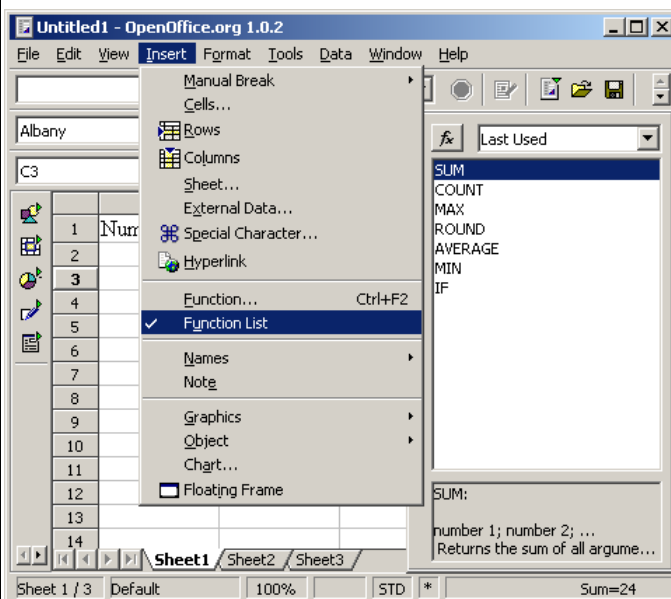


## Using a function to Total a column of numbers

Since totaling a long list of cells is a very common need in a spreadsheet, the computer can do this work for you instead of your needing to type in each cell. This kind of a helpful feature is called a *FUNCTION*. To get a total of several cells in a row or column, use the SUM() function. Type numbers into cells A2 through A5, then click on cell C3. Type “=SUM(A2:A5)” into C3 and press enter. Change the numbers in A2 through A5 and see what happens in C3.



There are many functions provided to make your work easier and faster. You may wish to look through them to see what is available. Click Insert on the menu bar then choose Function List to get a list of the available functions to browse.



## The Projects

You now know enough to try some projects. We will begin with a simple text entry project, the Telephone List. Next you will use formulae to build a mortgage amortization, and finally you will add multiple sheets to do a sales report with four sections with graphs.

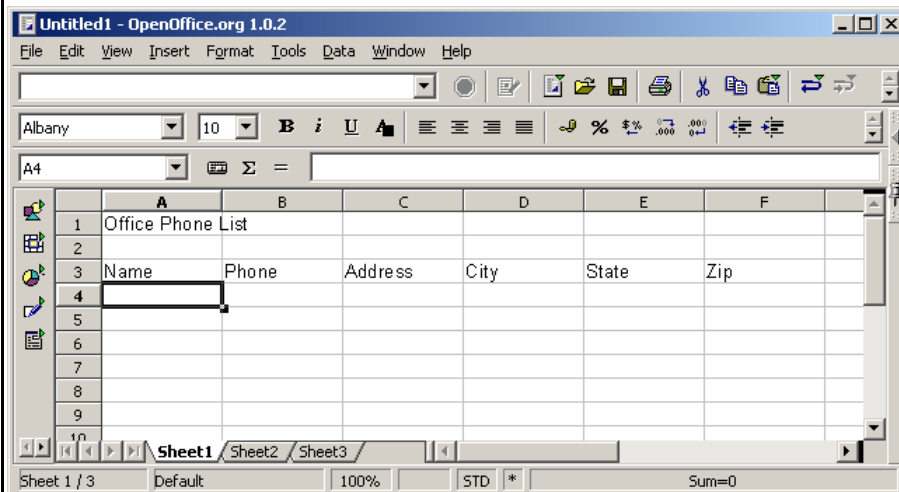
### Example Project #1: The Department Telephone List

#### Background

One of the most fundamental uses of the spreadsheet program is to produce a list of related items, either for a mail merge with a word processor, or for posting alone. One practical example is the department telephone list. Such a list simply shows the names, phone extensions and other useful information for quick reference. It requires no extreme knowledge of the spreadsheet to produce, and only moderate clerical skills. It is a good place for us to begin.

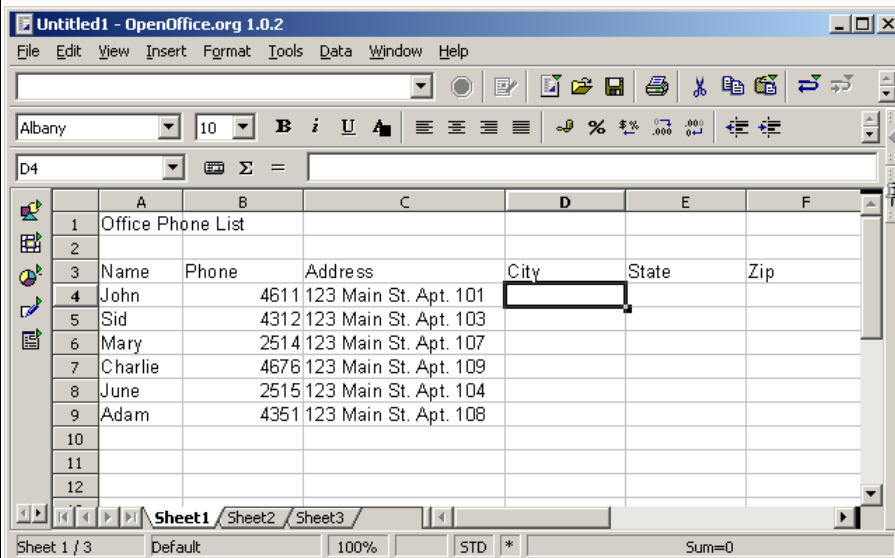
#### Enter the text and data

Enter the text as shown below to start the phone list. In A1 type Department Phone List. In A3 through F3 type Name, Phone, Address, City, State, Zip.

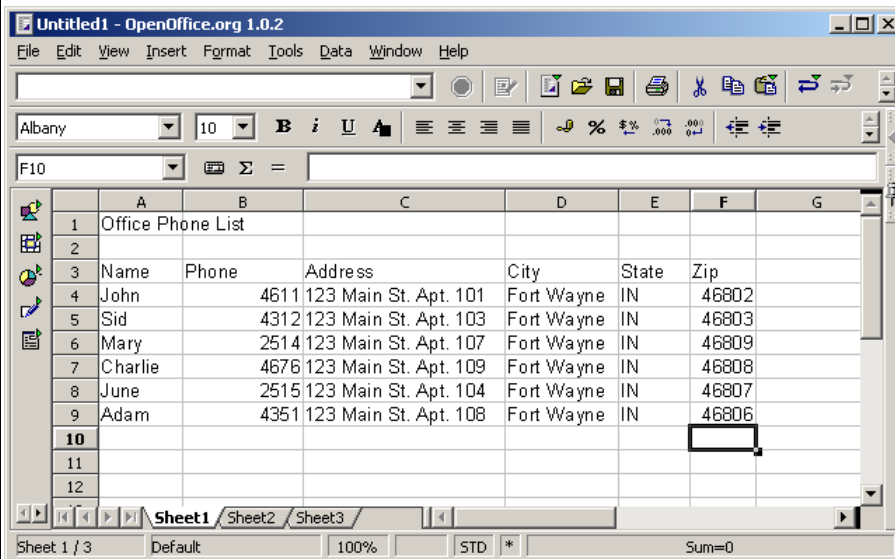


Make up some information that might be on your department phone list and fill in about six lines of names, phone numbers, and addresses beginning in row 4. Your work might look like the following screen shot:

Adjust the column width after the address (and if necessary the name) by mousing to the crack between the column headers. When the mouse pointer changes to a double arrow, then drag the column wider – release the mouse button when the width is right to fit your data.



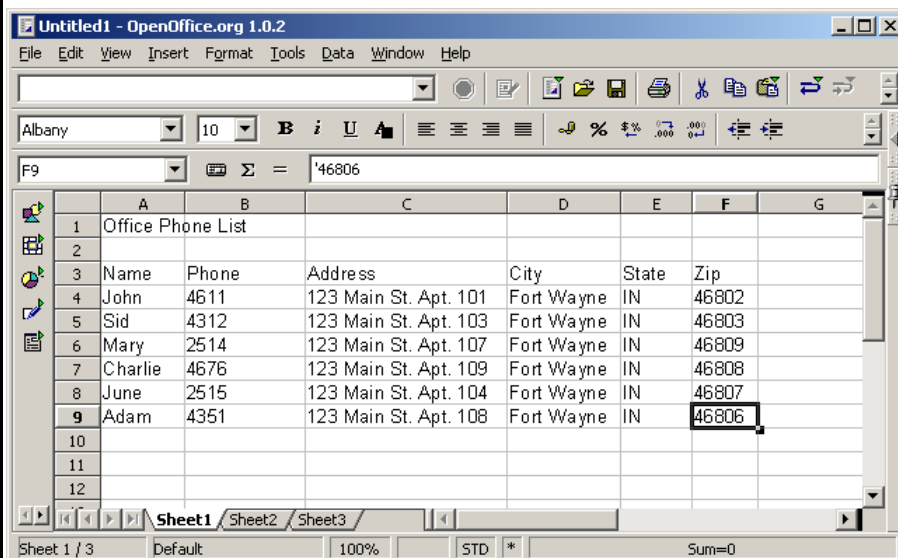
Make up information to fill in the remaining columns for City, State, and Zip.



### Formatting numbers to be treated as text

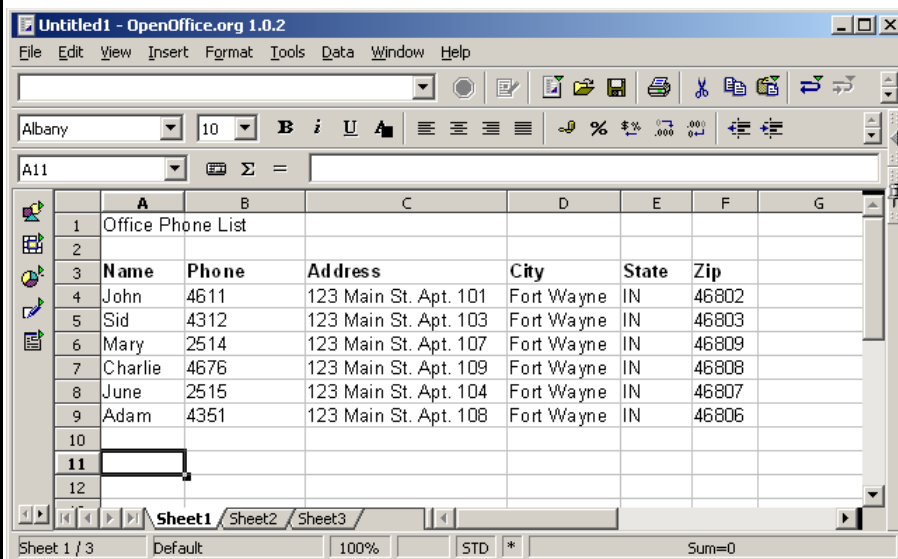
I notice that the phone extensions and zip codes are all the way to the right in the columns, and the other words are to the left. This is because the phone numbers and zip codes are purely numbers, with no text. The spreadsheet thinks they are numbers upon which it could do some calculations.

To tell the spreadsheet that these are just text for display and not numbers for calculations, re-type the numbers but start each line with a single quote mark, for example type '46808 for a zip code. The single quote is on the same key as the double quote, right next to the ENTER key. When you start each number with a single quote the spreadsheet will know this is not the kind of number it is supposed to do calculations with and it too will start at the left side of its cell.



### Format the Column Headings and Title Line

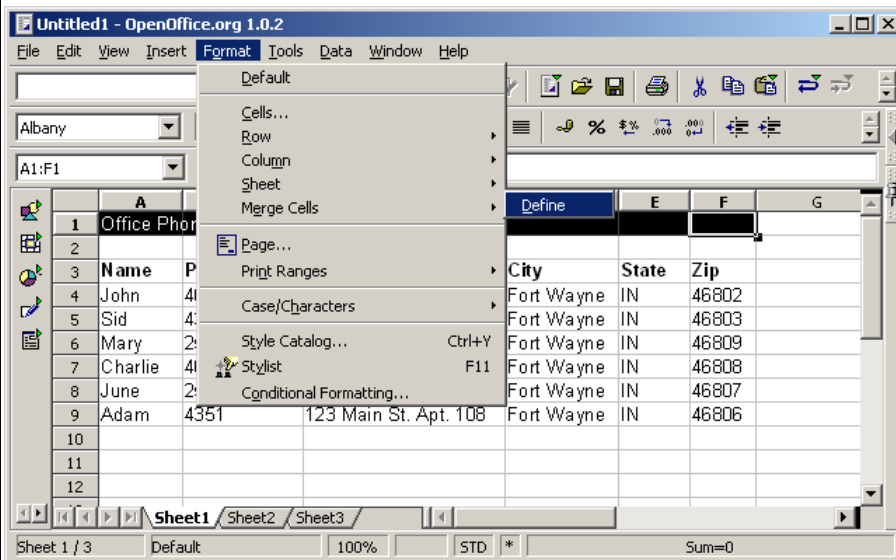
Now we need to make the headings at the top of each column stand out better, by bolding them. You can click each cell with a heading in it, for example A3 which has the heading “Name” in it, and then click the Bold button to bold just one cell. You can click the number of the row (3) to select the whole row and then click the bold button to bold that whole row in one smooth motion. Bold your column headings. You may use the Font Color button to change their color if you wish.



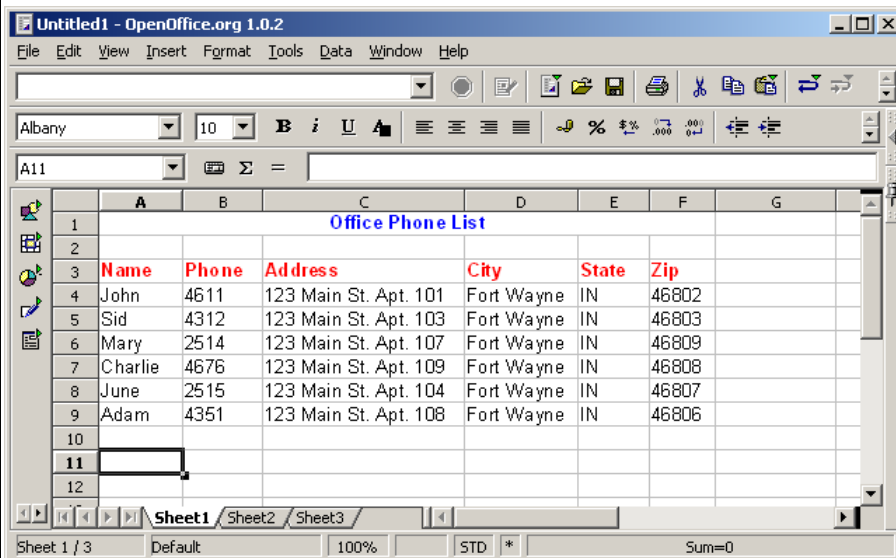
### Merge cells to center the title line over the whole page

We are almost finished. Bold the title “Office Phone List.” Do you notice how it is all the way to the left in cell A1? We can center it over the whole phone list so it looks nicer by telling the spreadsheet to think of all the cells A1 through F1 as if they were just one cell. This is called “merging” the cells.

Click on A1 and drag the mouse to F1. Cells A1 through F1 should now turn dark (be selected). Click **Format**, **Merge Cells**, **Define** to merge the cells into one cell.

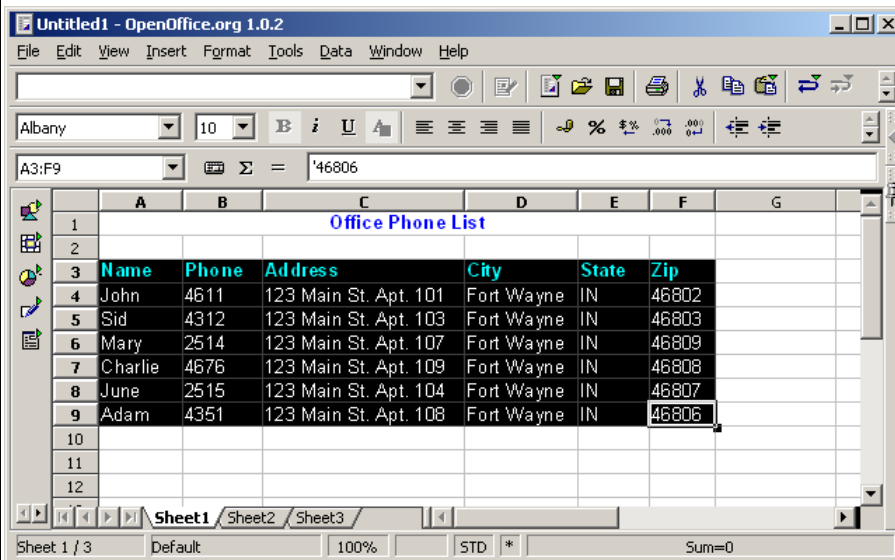


Then click the center button to center the title over the whole phone list. Change the color with the Font Color Button if you wish.

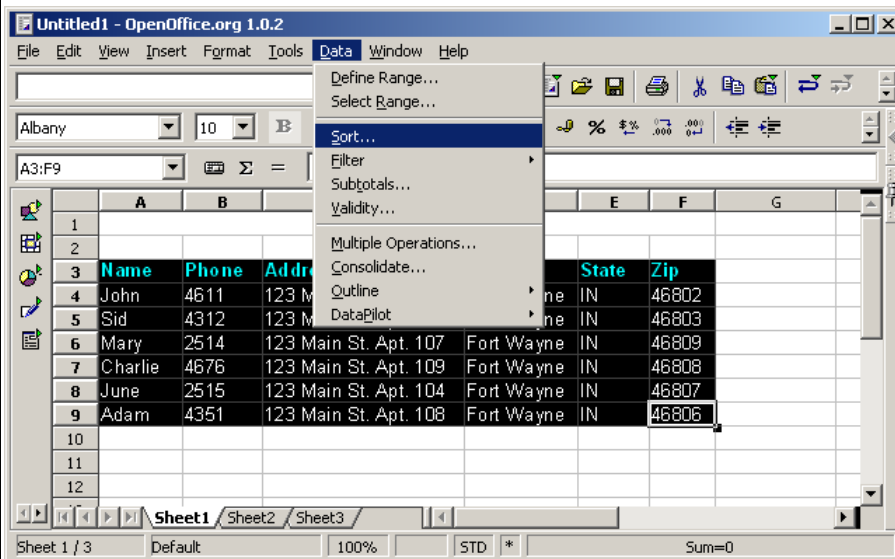


### Sorting

Sometimes it would be nice to see our office phone list sorted in different ways.; for mailing labels we would like to have it sorted by zip code, but for finding people we would like it sorted by name. OpenOffice can do this easily. Select the phone list from the column headers down to the last data line by clicking and holding the mouse over A3, dragging it down to F9, and releasing the button. The table should be selected now.

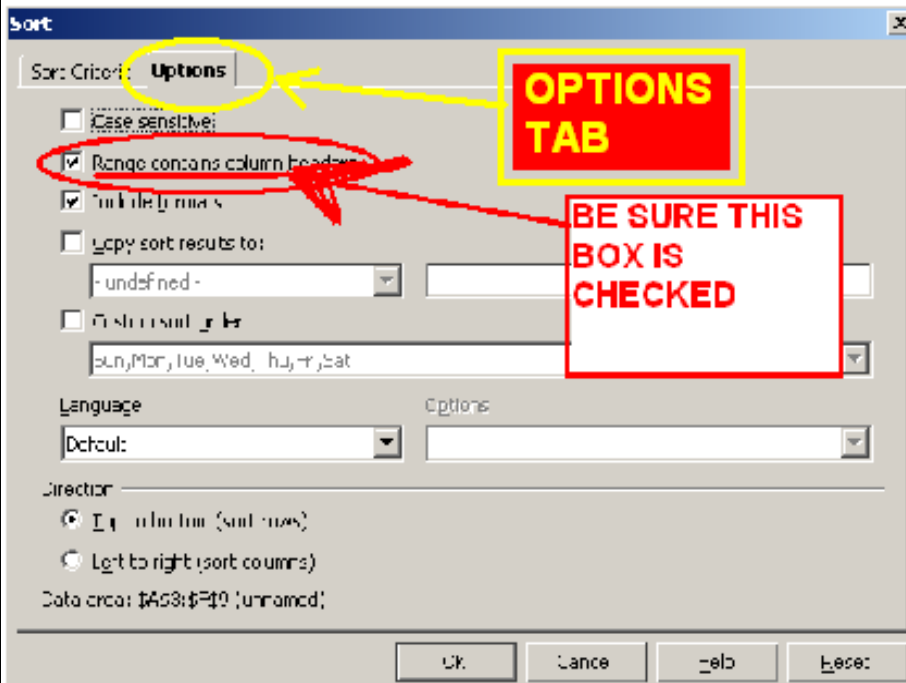


Click Data then Sort on the menu bar.

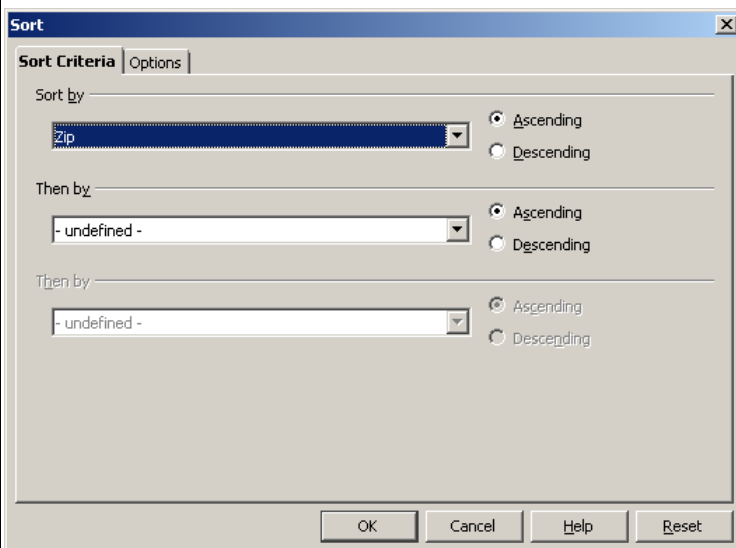


In the Options tab of the window that opens, be sure the “Range contains column headers” box is checked.





Click the Sort Criteria tab. From the first drop down box choose to sort by ZIP code. Press OK.



Your phone list has been sorted in zip code order now.

Office Phone List

	A	B	C	D	E	F
1	Office Phone List					
2						
3	Name	Phone	Address	City	State	Zip
4	John	4611	123 Main St. Apt. 101	Fort Wayne	IN	46802
5	Sid	4312	123 Main St. Apt. 103	Fort Wayne	IN	46803
6	Adam	4351	123 Main St. Apt. 108	Fort Wayne	IN	46806
7	June	2515	123 Main St. Apt. 104	Fort Wayne	IN	46807
8	Charlie	4676	123 Main St. Apt. 109	Fort Wayne	IN	46808
9	Mary	2514	123 Main St. Apt. 107	Fort Wayne	IN	46809
10						
11						

Click Data Sort again, but this time sort by name.

Office Phone List

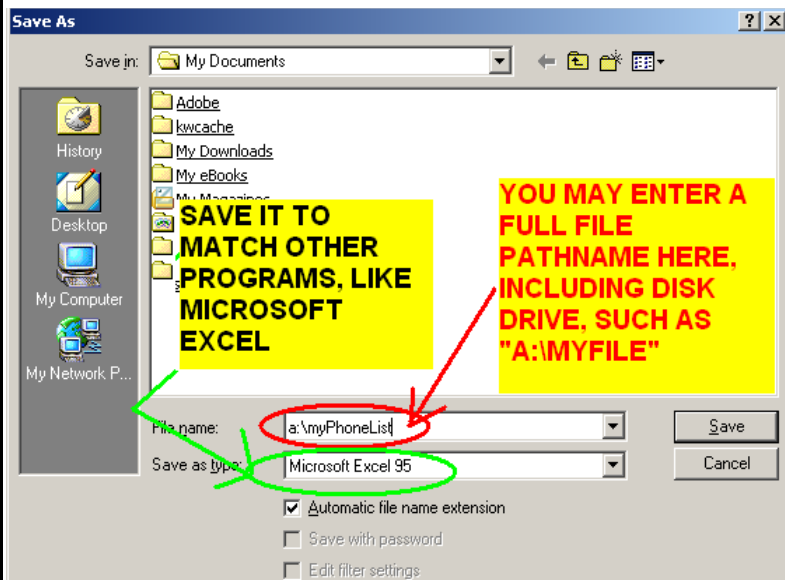
	A	B	C	D	E	F
1	Office Phone List					
2						
3	Name	Phone	Address	City	State	Zip
4	Adam	4351	123 Main St. Apt. 108	Fort Wayne	IN	46806
5	Charlie	4676	123 Main St. Apt. 109	Fort Wayne	IN	46808
6	John	4611	123 Main St. Apt. 101	Fort Wayne	IN	46802
7	June	2515	123 Main St. Apt. 104	Fort Wayne	IN	46807
8	Mary	2514	123 Main St. Apt. 107	Fort Wayne	IN	46809
9	Sid	4312	123 Main St. Apt. 103	Fort Wayne	IN	46803
10						
11						

You can also sort on each column, and on combinations. To sort by Zip code first and then by address you would select ZIP code in the first drop down box and ADDRESS in the second drop down box.

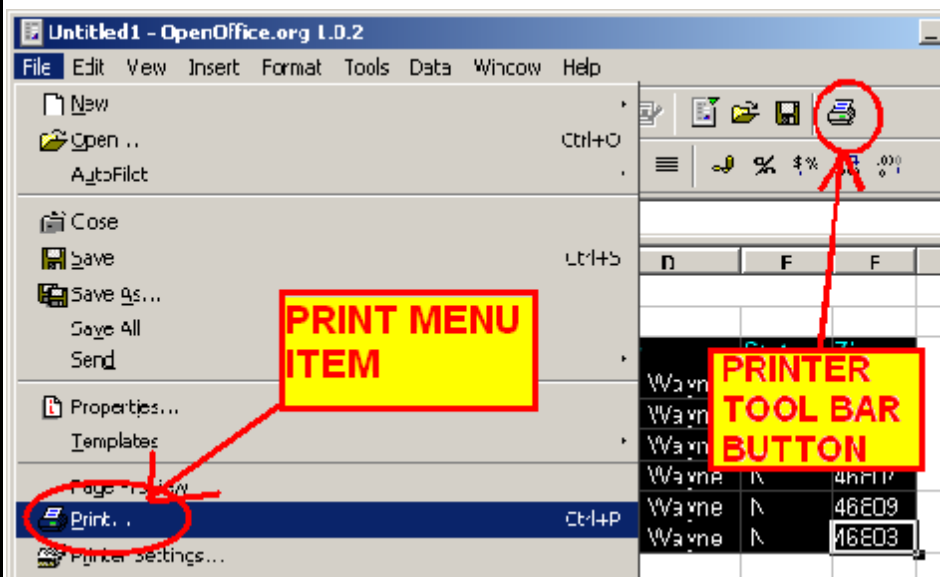
## Printing and Saving

The final basic step in using a spreadsheet is how to print and save your work. To save your work simple click the little diskette on the tool bar, or use the menu items File, Save. You can change where you store the file by using File SaveAs. The second drop down box on the file SaveAs screen lets you change the file format to be compatible with Microsoft programs, such as Excel.

BE SURE that the file name extension MATCHES the file type. OpenOffice will add an extension correctly for you if you do not include it, but it assumes that you know what you are doing if you leave one on there and change the file type. If you change the file type, such as from Open Office to Word 95, but forget to backspace out the “.doc” on the end of the file name, then you will save a file that neither Word nor OpenOffice can open! When in doubt, backspace it out. Word documents end in “.DOC” and OpenOffice documents end in “.sxw”.



To print, you press the little printer in the tool bar or use the File Print menu item.



## Example Project #2: The Mortgage Amortization Schedule

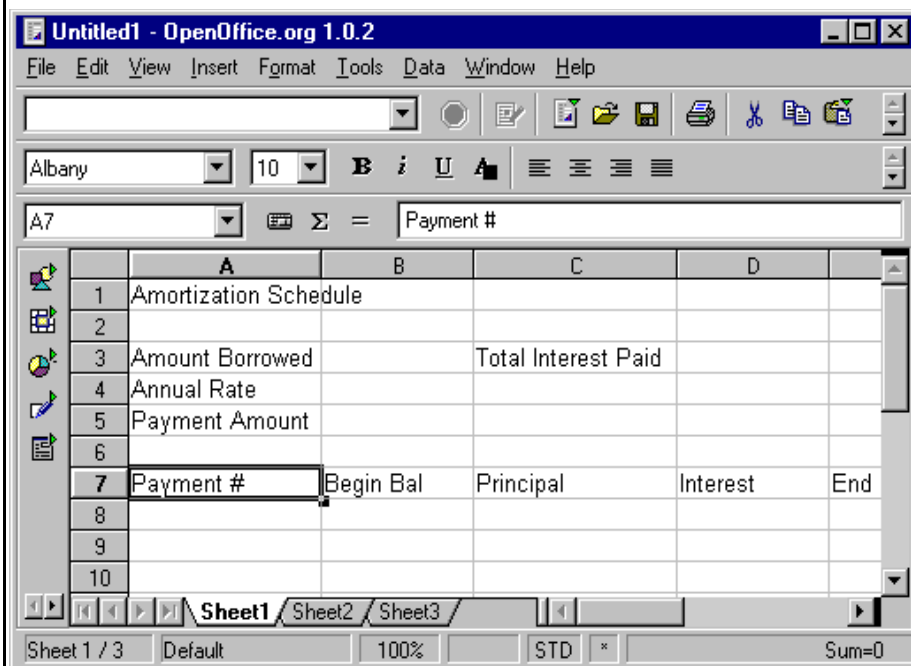
### Background

An amortization schedule shows the progress in paying off a mortgage or other loan. Each line of the schedule shows the activity from one payment: the beginning balance, the amount of principal and interest paid, and the ending balance. The interest rate, payment amount, and the amount initially borrowed are shown at the top of the schedule. By changing these values (rate, payment, and amount borrowed) we can see the dynamic value of the spreadsheet program: each change can have a significant effect on how much the loan costs us and when it is paid in full.

We will use a simple model for this schedule assuming that payments are made once each month and that interest is computed only once per month. A loan today would have interest compounded daily, not monthly, since it would make far more money for the lender.

### Entering the Heading Information

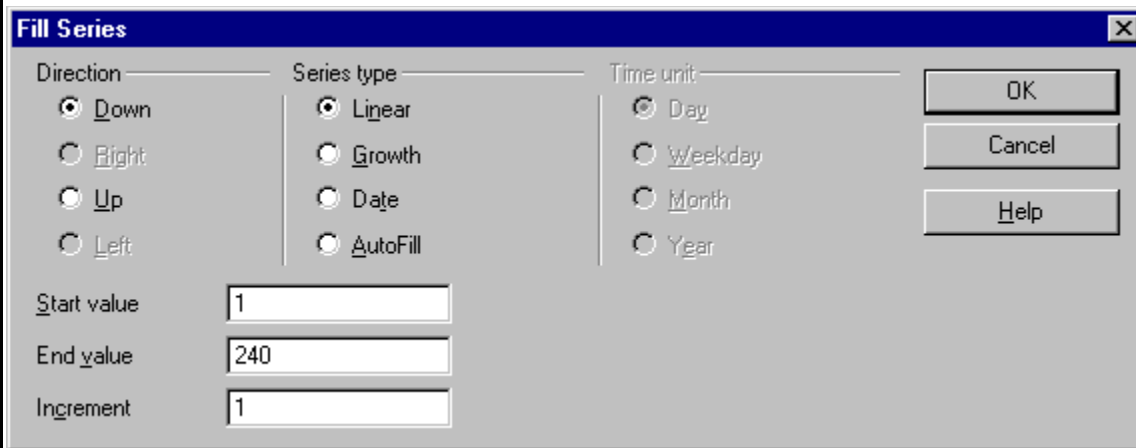
Begin by entering labels for the fields that we will use in the schedule as follows. See the following figure if you need help. In A1 enter “Amortization Schedule.” In A3 enter “Amount Borrowed”, in A4 enter “Annual Rate”, in A5 enter “Payment Amount”, in C3 enter “Total Interest Paid.” Adjust the column widths appropriately.



Use Format, Merge Cells, Define to merge cells A1 through E1 to make one long cell with the title (in A1) centered in it. In row seven (7) beginning with A7 enter “Payment #”, “Beginning Bal”, “Principal”, “Interest”, and “Ending Bal”. Make A3 Blue, A4 green, A5 Red, the font size 12 point, and bold them.

Underline and Bold row 7 and make it Brown. Leave the font size 10 for row seven. If you do not remember how to set the font characteristics then go back to the beginning of this document and re-read [the](#)

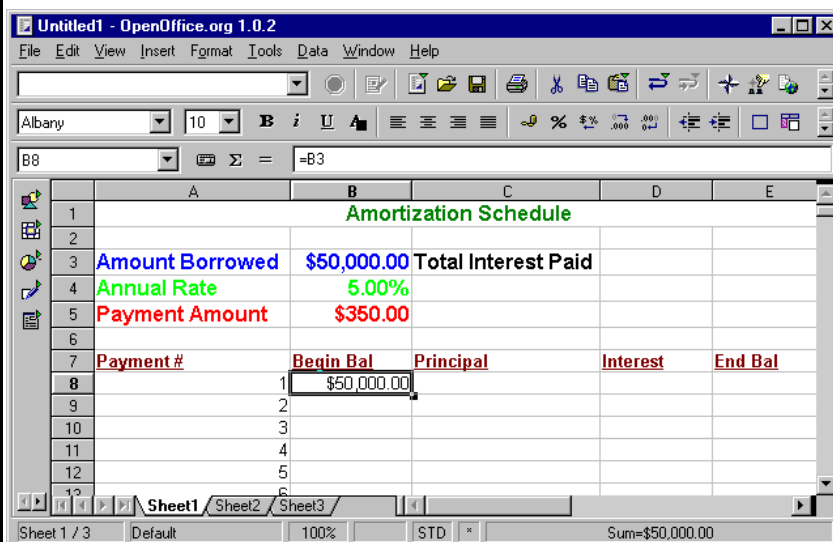




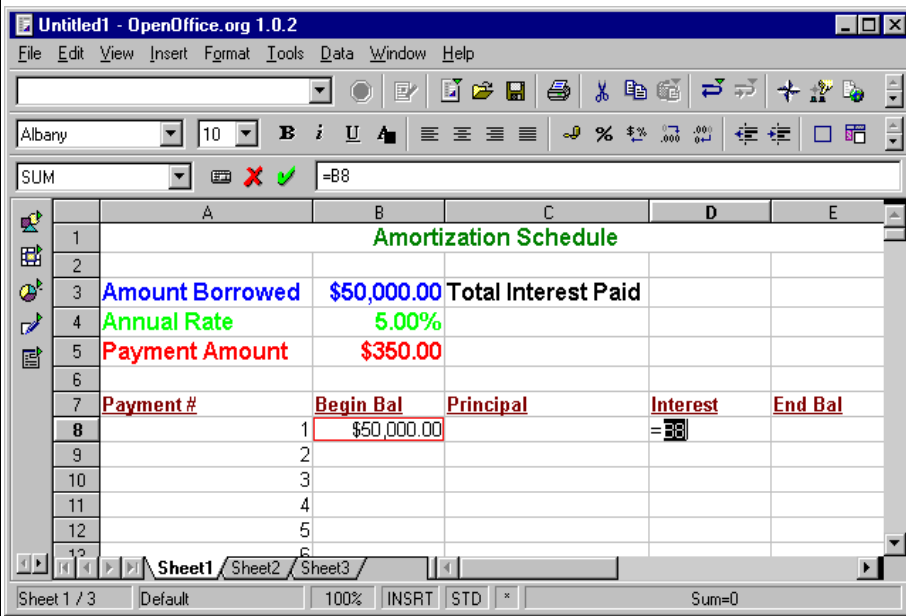
Click OK and the spreadsheet will fill in the column for you.

### Building the First Rows in the Schedule

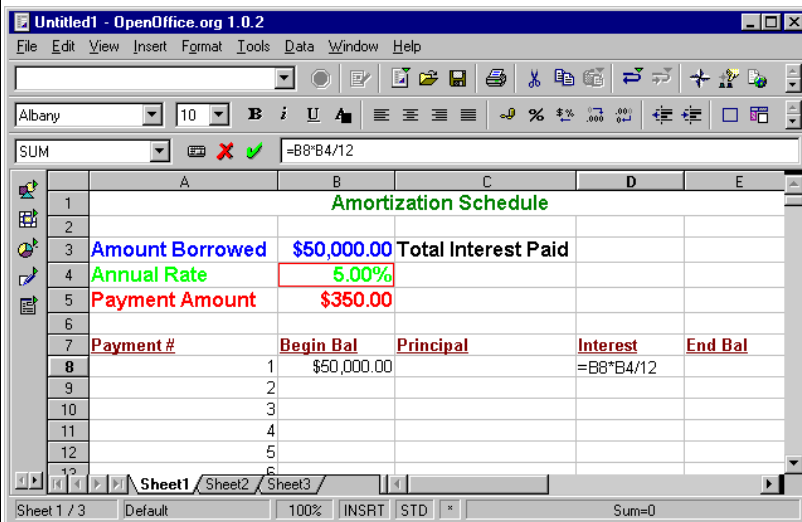
For every month except the first month, the beginning balance will be the same as the prior month's ending balance. For the first month the beginning balance is the amount borrowed. In B8 enter a formula to copy the amount borrowed value to B8. Click on B8, then type “=B3” and press ENTER to lock in the formula.



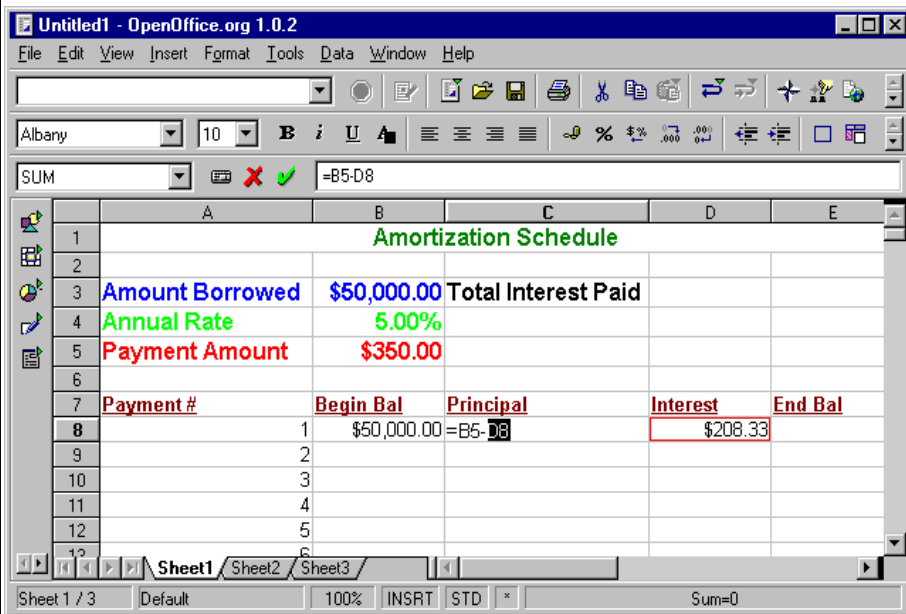
Click on D8. Since the interest is the beginning balance of the loan times the monthly interest rate, enter the formula for interest paid in D8. Remember that the interest rate at the top of the schedule is the ANNUAL interest rate – the rate for one year. The monthly interest rate is 1/12<sup>th</sup> the annual rate as there are 12 months in a year. In D8 start to enter the formula “=” then click on the beginning balance for this line (B8). Notice that the computer types the cell name B8 for you and draws a red box around cell B8 so that you can easily see what cell it is using.



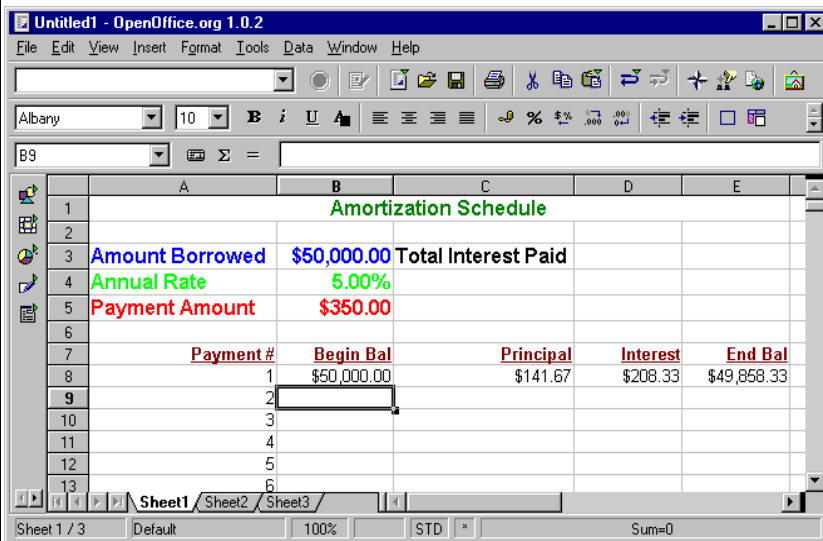
Don't stop yet: the formula is not complete. The interest is the beginning balance (B8) times the interest rate (B4) divided by 12 (the number of months in a year). Type the star (\*) to indicate Multiply, then click on the interest rate in B4. Notice that the spreadsheet types the B4 for you, and draws the red box around B4 now so you can see that. Next type the divide sign, /, and 12 to divide the rate by 12. You should have something like the following:



Press ENTER to lock in the formula. Next click on cell C8. The principal paid is the amount of the payment less any interest paid. If a \$300 payment is made and \$200 interest is paid then the remaining \$100 applies to principal. Enter this formula in C8: “= “ then click on the payment amount (cell B5), then a minus sign “-” then the interest paid on this line (cell D8). You should have something like the following:

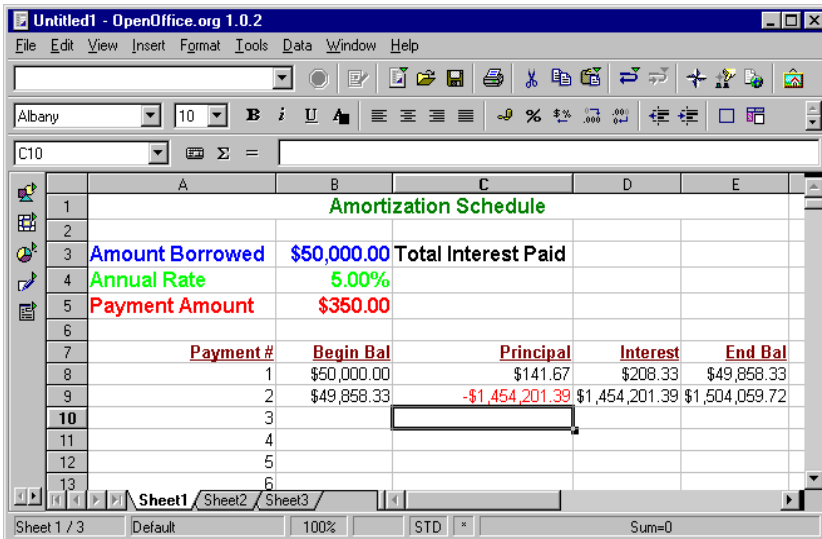


Press ENTER to lock in your formula. Now we can calculate the ending balance on this line as the beginning balance on this line less the principal paid on this line. Click on E8. Enter the formula “=B8-C8” and press ENTER to lock in the formula. Right justify the titles on row seven so that they look nicer. Highlight row seven by clicking the seven at the left of the row, then click the right justify button. You should have something like the following:



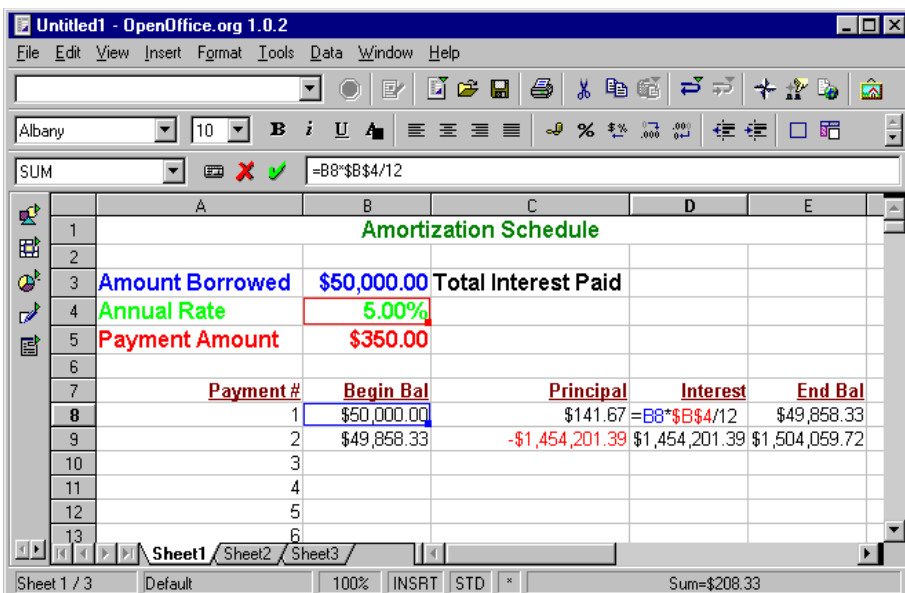
Now we can fill in the second row. We will use copy and paste to duplicate this second row to fill in the remaining rows on the amortization schedule. The beginning balance on row two is the same as the ending balance on the row before it, row 1, so type “=E8” in cell B9. Since principal, interest, and end balance are computed within this row, we can copy the formulae from the row above and paste them in this row. Select cells C8, D8, and E8 by clicking in C8 and dragging to E8. Press ^C or the Copy button to copy the cells, then click cell C9 and press ^V or click the Paste button to past a copy of them in the second row. What is wrong with this picture? You should get something like the following:



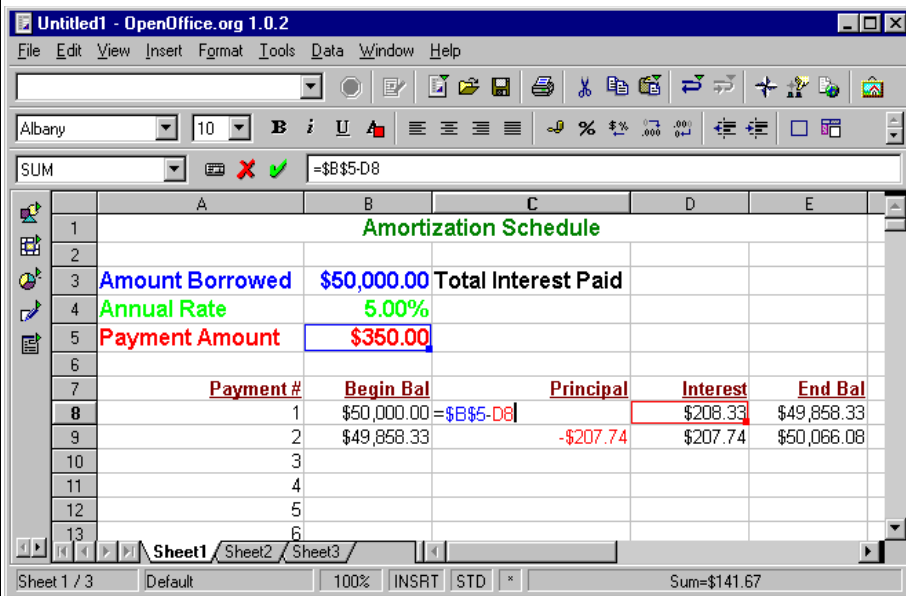


These numbers in row two are clearly wrong! What happened? Look at the formulae in Cells D8 and D9. Notice that for the value of the interest rate we have cell B4 (correct) in the formula of D8, but in cell C9 we have cell B5 for the interest rate (it should be B4). This is because when cells are copied in a spreadsheet, the spreadsheet automatically adjusts them to fit where they are being copied to. We wanted the beginning balance cell to change in the formula, which it correctly did (from row 8 to row 9). But interest rate (in column D) and payment amount (in the formulae in column C) should always point to the same place. We tell the spreadsheet to lock these cell names and not change them as we copy/paste cells by preceding the letter # and number of the fixed cell name with dollar signs(\$).

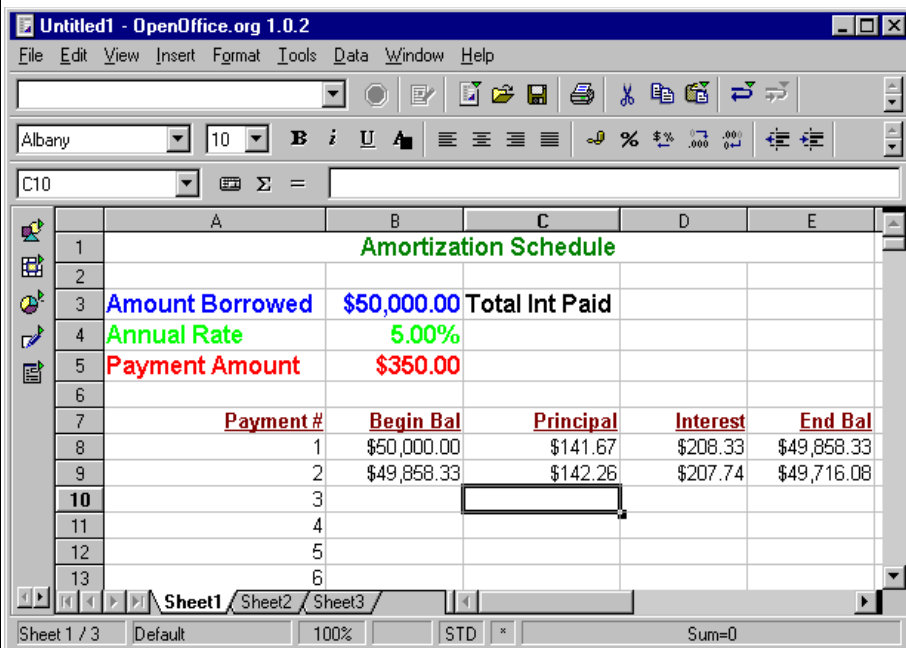
Click on cell D8 and press F2 to begin editing it right in the cell. Notice that the spreadsheet colors the cell names and draws matching colored boxes around the actual cells to help you see where they are. Change the cell name for the interest rate from B4 to \$B\$4 and press enter to lock in the change. *If you do not do this then your calculations will not work.*



Copy cell D8 to cell D9 and see the difference. Change the reference to cell B5 in the formula in C8 likewise, changing the “B5” to \$B\$5”. *If you do not do this then your calculations will not work.*



Copy cell C8 to C9 and see the difference. Also, edit C3 to change the “Total Interest Paid” to “Total Int. Paid” and adjust the width on column C to make your spreadsheet look a little nicer. You should have something that looks like this:



Now the numbers our second payment row look right. We can copy that row to the remaining 238 rows instead of typing each one. Yeah!

**Filling in the Schedule by Copying Rows**

Select columns B through E in the second payment row (B9 through E9), and copy them. Then click on B10, the third payment row, hold down shift and press down arrow or page down until you reach the end of

the schedule in payment row #240. Release the shift key and press paste to copy the formulae from payment row #2 to the remaining payment rows.

The screenshot shows a spreadsheet window titled 'Untitled1 - OpenOffice.org 1.0.2'. The spreadsheet contains a table with the following data:

	A	B	C	D	E
243	236	-\$6,332.10	\$376.38	-\$26.38	-\$6,708.49
244	237	-\$6,708.49	\$377.95	-\$27.95	-\$7,086.44
245	238	-\$7,086.44	\$379.53	-\$29.53	-\$7,465.97
246	239	-\$7,465.97	\$381.11	-\$31.11	-\$7,847.07
247	240	-\$7,847.07	\$382.70	-\$32.70	-\$8,229.77
248					

The formula bar at the top shows '=E246'. The status bar at the bottom indicates 'Sum=-\$7,847.07'.

Now we enter into the next part of using a spreadsheet program – using it to get answers to our questions!

### The “What If” Spreadsheet Game

The importance of the spreadsheet is due to the way that a changes to one cell are automatically applied to the rest. If one cell changes, then all the cells which have that cell in their formula also change, then all the cells that have those cells in their formulae change, and so on. This allows us to change one number, say annual interest rate or monthly payment amount, and see the effect of that change in how much is due at the end of the loan, how soon the loan is paid off, or the total amount of interest paid.

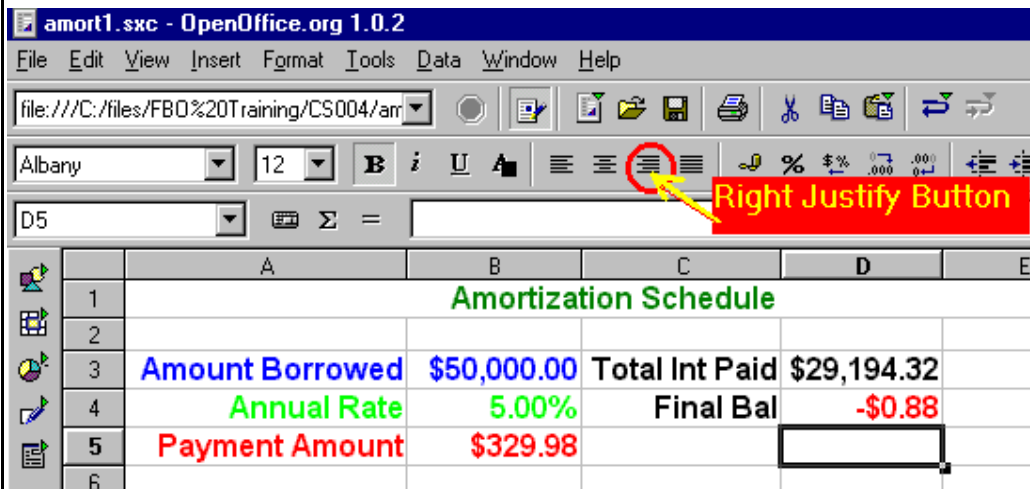
When doing a “what if” analysis it is helpful for us to have all the numbers where we can see them at once. We want the total interest paid over the entire loan in cell D3. Use the SUM() function to sum the total interest paid which is the sum of column D, cells D8 through D247. In cell D3 enter “=SUM(D8:D247)”. We also need to see the ending balance, which we want to make zero to have the loan paid off. This amount is the ending balance after the last loan payment, which is cell E247. In cell D4 enter the formula “=E247”. You may put some label, such as “Final Bal” in C4 next to this number. When you are ready to begin you should have something like this:

	A	B	C	D	E
1	<b>Amortization Schedule</b>				
2					
3	<b>Amount Borrowed</b>	<b>\$50,000.00</b>	<b>Total Int Paid</b>	<b>\$25,770.23</b>	
4	<b>Annual Rate</b>	<b>5.00%</b>	<b>Final Bal</b>	<b>-\$8,229.77</b>	
5	<b>Payment Amount</b>	<b>\$350.00</b>			
6					
7	<b>Payment #</b>	<b>Begin Bal</b>	<b>Principal</b>	<b>Interest</b>	<b>End Bal</b>
8	1	\$50,000.00	\$141.67	\$208.33	\$49,858.33
9	2	\$49,858.33	\$142.26	\$207.74	\$49,716.08
10	3	\$49,716.08	\$142.85	\$207.15	\$49,573.23

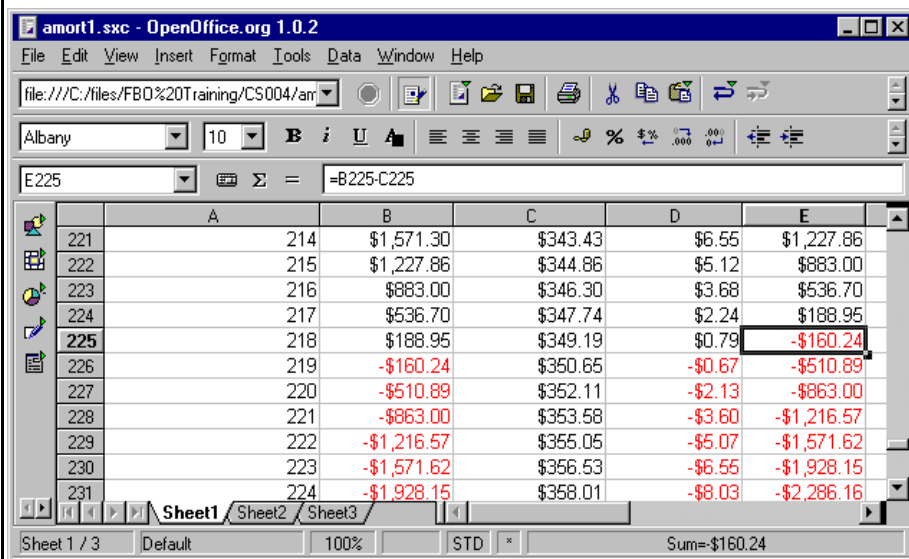
If you scroll down you will see that by payment number 218 the loan is paid off: after that the balance due is a negative amount.

	A	B	C	D	E
222	215	\$1,220.98	\$344.91	\$5.09	\$876.06
223	216	\$876.06	\$346.35	\$3.65	\$529.71
224	217	\$529.71	\$347.79	\$2.21	\$181.92
225	218	\$181.92	\$349.24	\$0.76	-\$167.32
226	219	-\$167.32	\$350.70	-\$0.70	-\$518.02
227	220	-\$518.02	\$352.16	-\$2.16	-\$870.18
228	221	-\$870.18	\$353.63	-\$3.63	-\$1,223.80
229	222	-\$1,223.80	\$355.10	-\$5.10	-\$1,578.90
230	223	-\$1,578.90	\$356.58	-\$6.58	-\$1,935.48
231	224	-\$1,935.48	\$358.06	-\$8.06	-\$2,293.54
232	225	-\$2,293.54	\$359.56	-\$9.56	-\$2,653.10

We want to find what monthly payment will pay off the loan exactly on the last payment. Change the monthly payment amount and watch the final balance in D4. Find what monthly payment is needed to get an End Balance on the last payment as close to zero as possible. The solution that I got is shown below. I right justified the labels on my spreadsheet to make it look snazzier.



Increase the monthly payment (B5) by \$20. In what payment # is the loan totally paid off? How much less interest is paid? The loan is paid in full by payment #218 (almost two years early) and the total interest is \$25,773.65: \$3,420.67 less than when making only the required payment.



Now try changing the interest rate to 6% and see how much more you must pay each month to have the loan come out right. Set B4 to 6% and find the new value for monthly payment that gets the final balance as close to zero as possible. A 1% change in interest rate or a \$20 addition to your monthly loan payment can make a big difference in how much a loan costs you!

	A	B	C	D	E
1	<b>Amortization Schedule</b>				
2					
3	Amount Borrowed	\$50,000.00	Total Int Paid	\$35,970.73	
4	Annual Rate	6.00%	Final Bal	-\$2.07	
5	Payment Amount	\$358.22			
6					
7	<u>Payment #</u>	<u>Begin Bal</u>	<u>Principal</u>	<u>Interest</u>	<u>End Bal</u>
8	1	\$50,000.00	\$108.22	\$250.00	\$49,891.78
9	2	\$49,891.78	\$108.76	\$249.46	\$49,783.02
10	3	\$49,783.02	\$109.30	\$248.92	\$49,673.71

Hopefully now you can see part of the importance of using a spreadsheet to discover the impact of financial changes. This same approach can be used for budgeting in hard times by spreading your available money proportionally across all the bills that you must pay, thus keeping your creditors as happy as possible by paying each of them something each month.

### Example Project #3: Regional Quarterly Sales Graphs, using five sheets

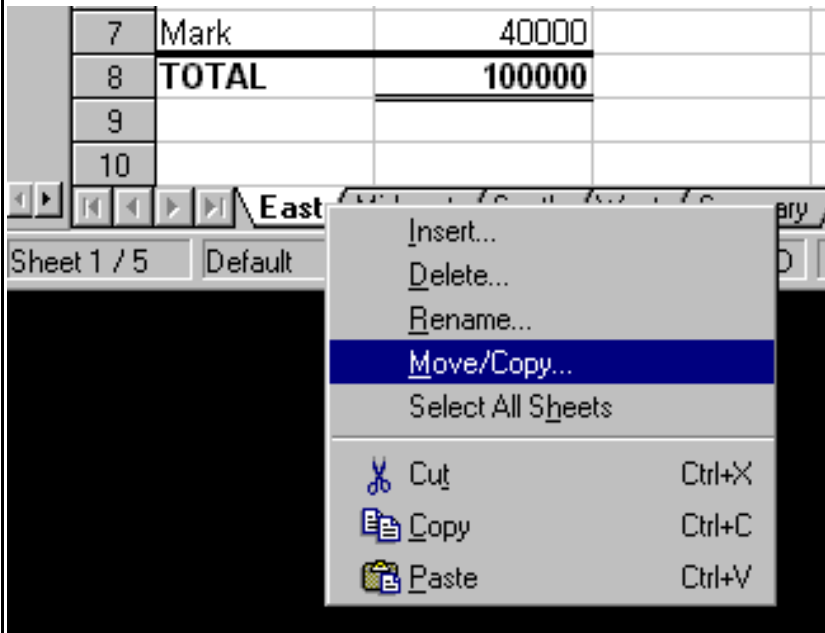
#### Background

Most business meetings involve graphical presentation of information in some way. A spreadsheet can easily display numeric data, such as quarterly sales by regions, in several popular graphical formats. In this exercise you will create a spreadsheet with regional sales data on each of four sheets, one sheet to a region. You will summarize and graph this data on a fifth sheet, called “summary.”

Open a new spreadsheet. On sheet 1 place a title “East Region Sales 1Q2003” in cell A1. Place titles “Sales Rep” and “Sales” in A3 and B3. Add four imaginary salespersons in A4 through A7 and their imaginary sales amounts in B4 through B7. Total the amounts in B4 through B7 using the SUM() function in cell B8. Add formatting to make your sheet look like the following.

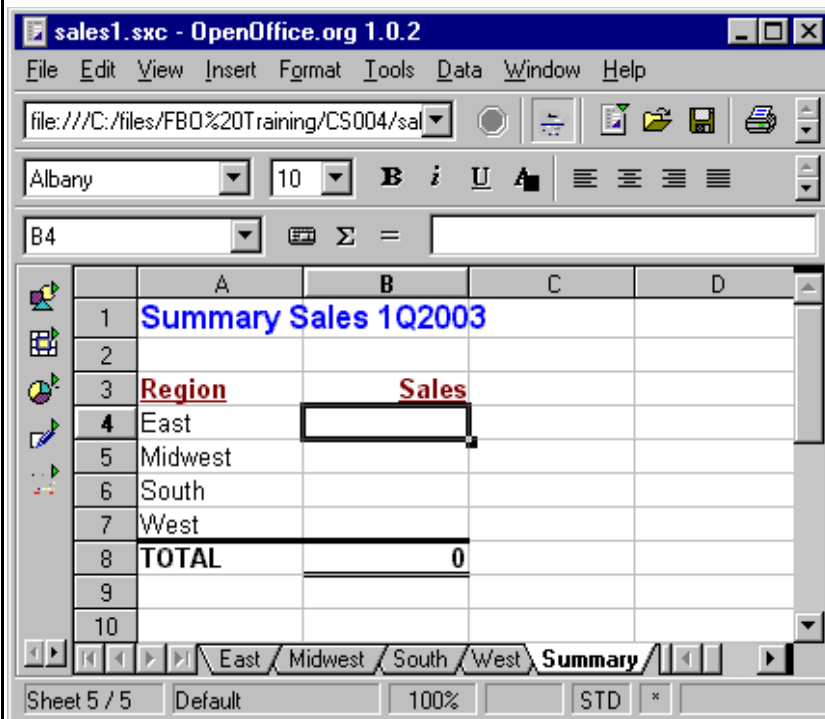
	A	B	C	D
1	<b>West Sales 1Q2003</b>			
2				
3	<b>Sales Rep</b>	<b>Sales</b>		
4	Arnold	10000		
5	Ross	20000		
6	Sandy	30000		
7	Betrice	40000		
8	<b>TOTAL</b>	<b>100000</b>		
9				
10				

You can get the line above the total row by using Format, Cells, Borders. Rename sheet 1 to “East” by right clicking on the tab and selecting Rename from the pop-up menu. Right click on the tab and use Move/Copy to make three duplicates of East, and rename them to Midwest, South, and West. You must first click on the tab before right clicking will let you change the tab's label.



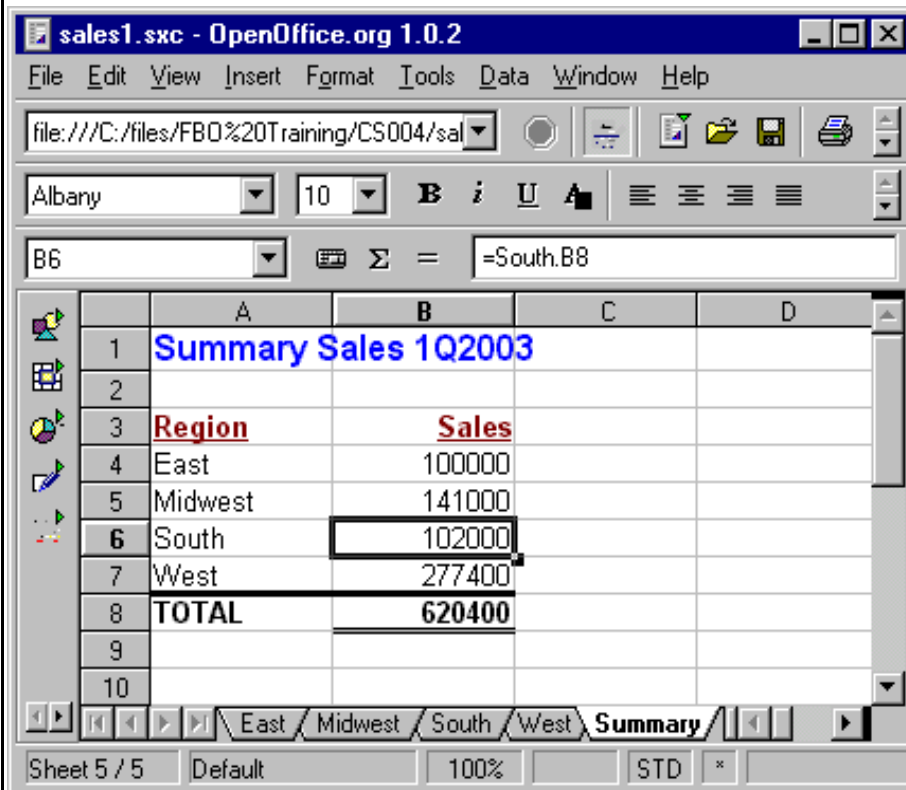
Change the title lines in A1 on each sheet appropriately. You may wish to change the names and sales numbers.

Now, rename one of the remaining sheets (2 or 3) to “Summary” and delete the other sheet. Click the tab then right click and use rename or delete from the pop-up menu. In A1 on the summary sheet, use the title “Sales Summary 1Q2003”. In A3 and B3 put titles “Region” and “Sales”. In A4 through A7 put the names of the regions, East, Midwest, South, and West. In A8 put “TOTAL” and in B8 put the sum of B4 through B7. You should have something like the following:

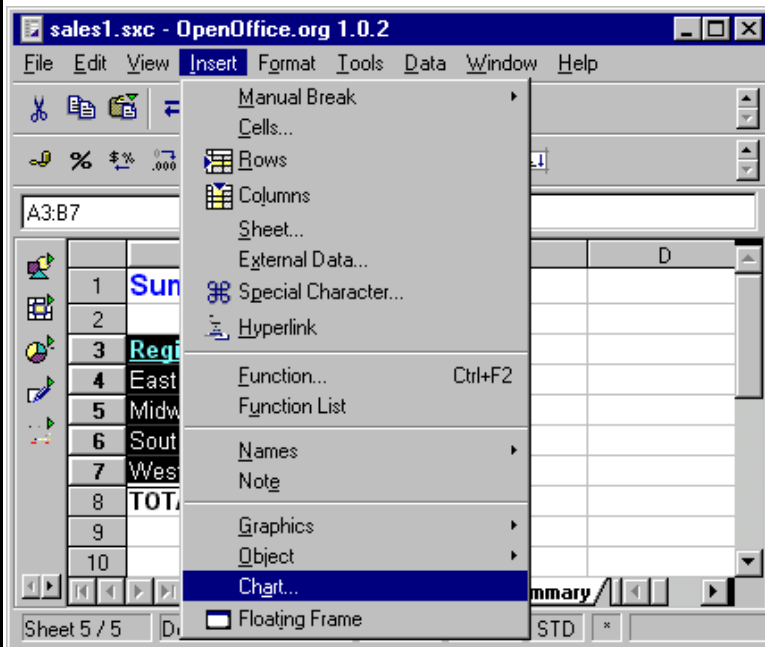




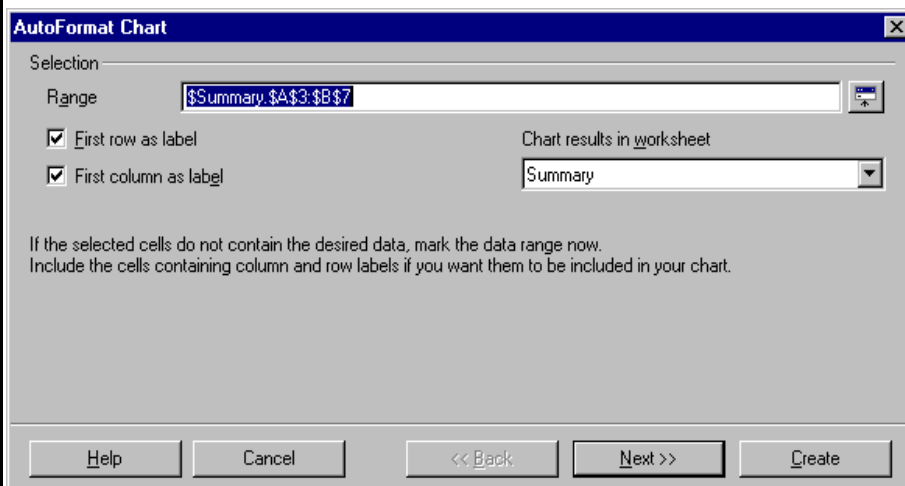
Now it is time to gather the totals from each of the regional sales and show them on the summary sheet. Begin by clicking on the East Sales cell on the summary sheet, B4. We call this "Summary.B4" to differentiate between the several sheets. This is also the way the reference will appear in formulae. Start a formula by typing =, then click on the East sheet and then click on the total cell (East.B8). Press ENTER to lock in the formula. Notice that the value in the total cell on the East sheet now also appears in the East region cell on the Summary sheet. Changes to the East sheet will be shown on the Summary sheet also. Fill in the sales number for the Midwest, South, and West regions in the same way. You should get something like the following:



The hard part is now done. If the sales calculations were more complex, that would be on each regional sheet. All that we have on the summary sheet is a summary of all the regions together. To graph this now we simply select the table above the totals line (A3 through B7), including the titles (Region and Sales), then use **Insert, Chart** and follow the screens.

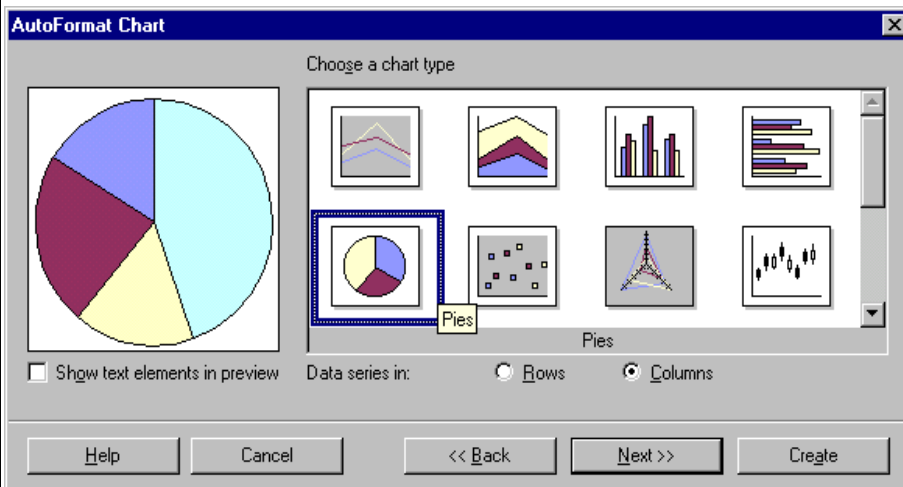


The first screen should look like this.



Click Next.

The next screen should look like this. We choose a pie chart for this example, but several charts are possible. Click the one that you want to use.



Note the slider bar at the right of the sample charts: there are more charts possible than will fit in the top of this dialog box. There are 3-D charts below. Click on a chart and click Create.

You can drag and resize the chart similar to how you drag and resize windows.

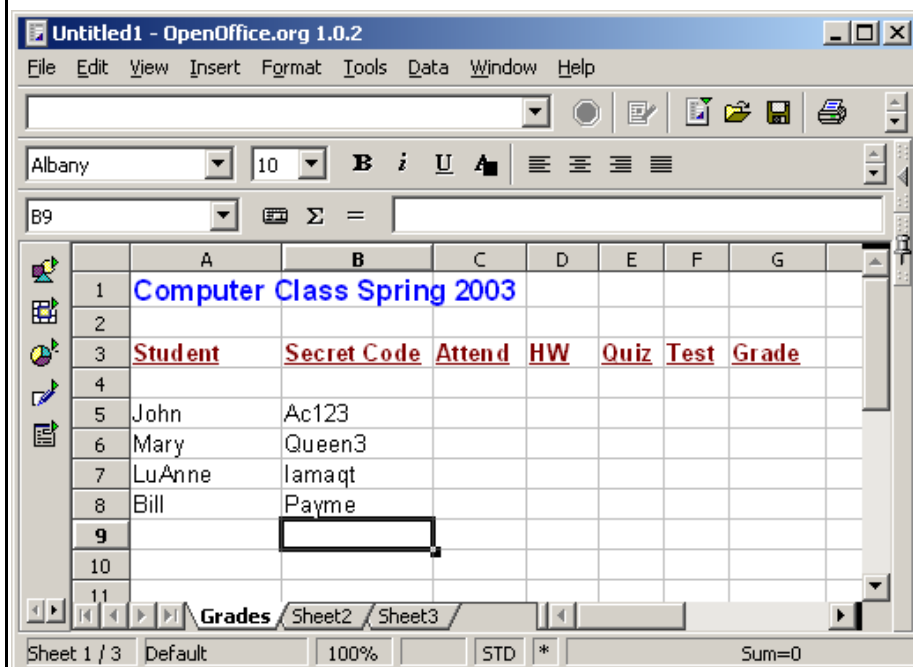
### Example Project #4: Grades on the Web

One of the most useful applications of the spreadsheet for me has been publishing student grades. Each student has a code name for privacy concerns. I copy the grades from my Ward 910 lesson planner to the spreadsheet, then use the File, Save As menu command to save the information to a very nice looking web page. The students then can see their progress and bring any recording questions to me attention before things become hectic at the end of the semester.

Creating a grade book for the web is very much like preparing sales figures.

#### The Grade Sheet

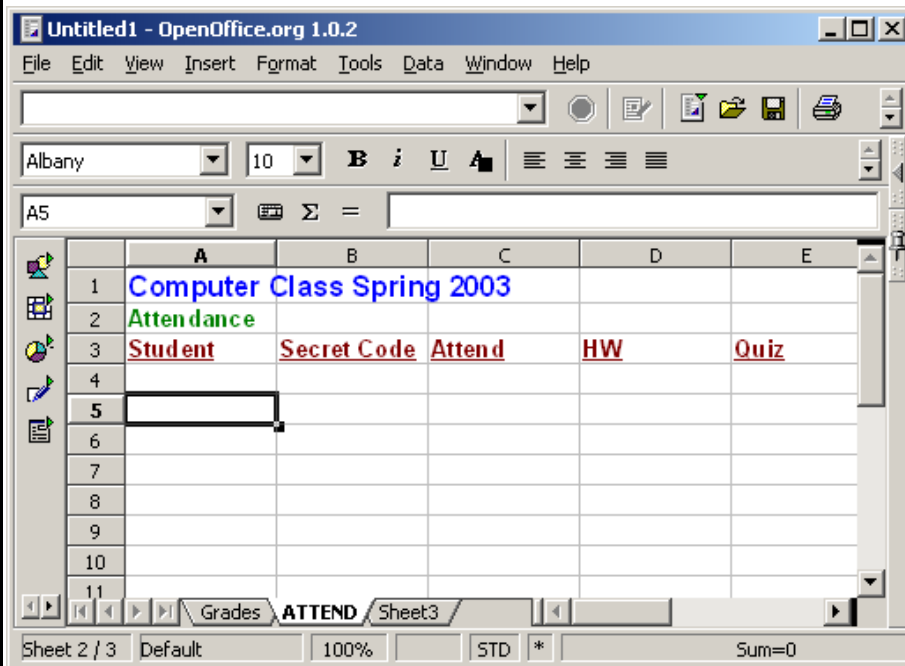
You can put everything on one sheet and try to navigate it all, but I use a separate sheet for each major grading criteria: quizzes, tests, homework, projects, and attendance. The top sheet I call “Grades” and key everything else off of that. Begin by naming the sheet “Grades.” Next place a title in A1 to identify the page, such as “Accounting Class Spring 2003.” In row 3 place column headings for the necessary summary information: Name, Code, Homework, Quizzes, Tests, and Grade. Format the text to please yourself. Add some student names and codes. Remember to Right click the tab and use Rename to rename the tab “Grades” instead of “Sheet1.” You should get something like the following:



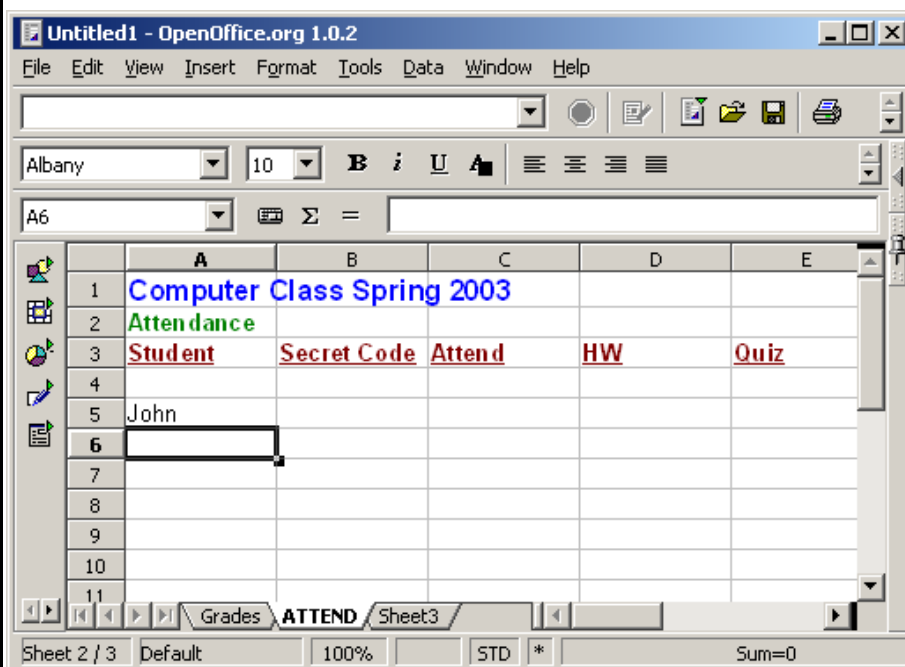
We will figure the averages for each grade criteria on its own sheet. We will do a sheet together for Attendance first and then you can make the rest of your sheets for quiz, test and whatever you like to use.

#### The Attendance Sheet

Click sheet2 to select it, and rename it to ATTEND. Put appropriate title and column headings on it. You can do this with cut and paste from the Grades sheet and just edit. Do NOT copy the student names – we will get that with a formula which is much better. You should get something like this:

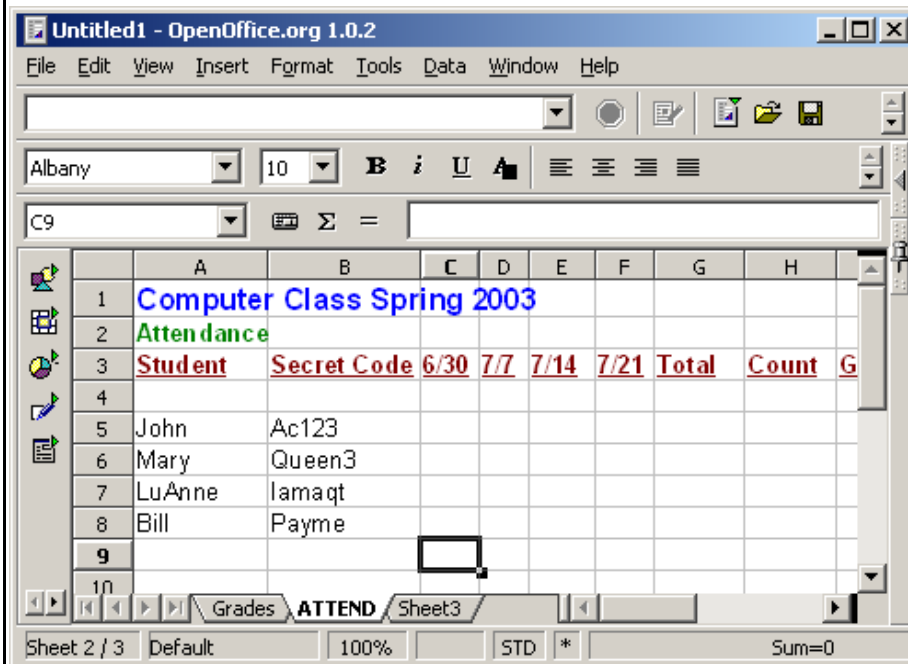


In A5, where the first student name would go, we will use a formula to copy the name for us from the Grade sheet. Type a “=” to start the formula, then click the Grade sheet tab, then click the first student name, and finally press ENTER to lock in the formula. You will see the name copied. If you change the name on the Grade sheet, then it will automatically update on the other sheets. You should have something like this:



Copy the formula to the other cells in column A. We need to go through at least A8 here, but you go as far as is required to cover all your students. Copy the formula again to column B from B5 to B8 (or whatever) to match your column A. You should see the student names and codes copied to the Attendance sheet for you. This is also a good time to fix the column headings, with the last three being called “Total,” “Count,” and

“Grade.” We will use these to calculate the attendance grade for each student. To add grading events simply click on a cell in the Total column and use Insert Column to add a column BEFORE the Total column.

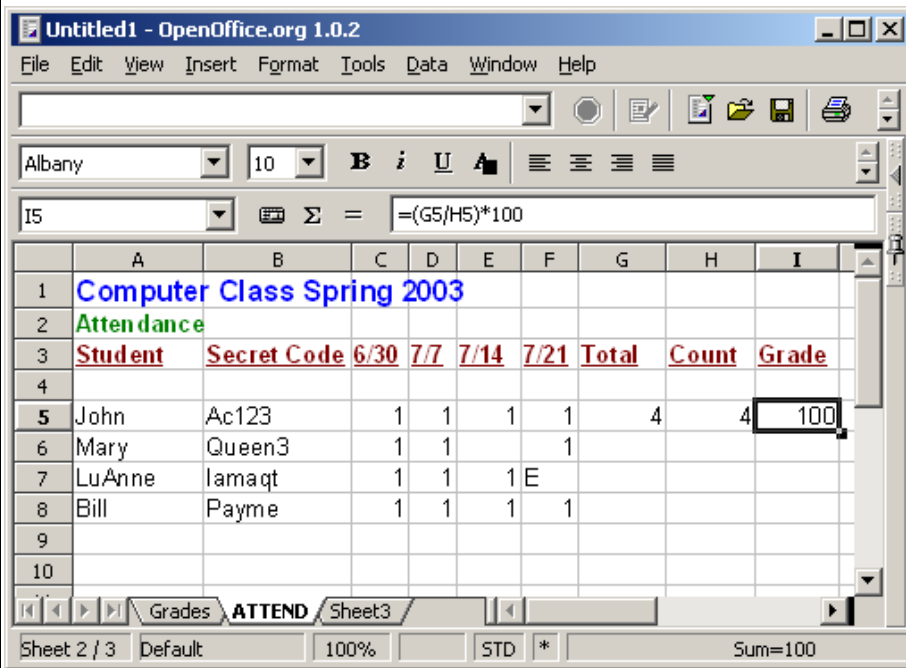


Notice the content of the formula box: it includes not only the CELL name but also the name of the sheet on which the cell is found. The sheet name dot cell name is a convention used frequently in programming, and it is used in the spreadsheet here also. “Grades.B8” is read Grades dot B8 and it means “on the sheet named Grades use cell B8.”

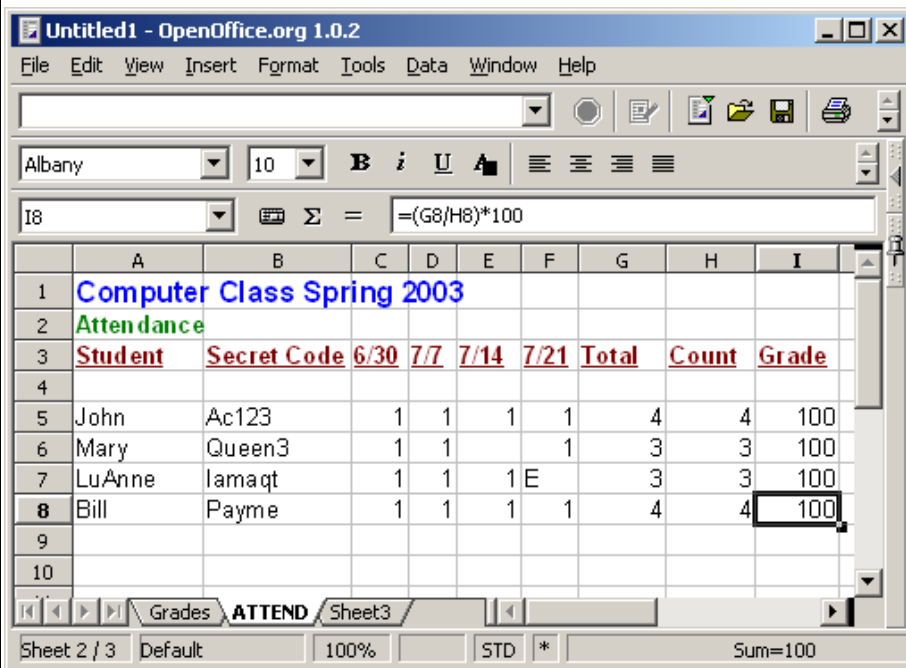
### The Formulae

Now we can enter some formulae for the grade calculation. We add a column for each attendance event, and I have used the date of the class for my column headings. Total is the total number of classes attended. Count is the total number possible. Grade is Total divided by Count. You may use a different formula if you like. I record a “1” for each time a student is present and a zero for times absent. I leave the cell empty or use an “E” if they are excused. Blank cells and letters are not numbers, so they will not count against the excused student.

For the Total column, in cell G5 enter the formula “=SUM(C5:F5)”. For the Count column, in cell H5 enter the formula “=COUNT(C5:F5)”. For the Grade column, in cell I5 enter the formula “=(G5/H5)\*100”. Don't type the quote marks when you enter these formulae.



Copy the three cells, G5 through I5, then paste them in the remaining rows. You should get something like this:



Notice blank cells or those with an “E” in them do not count as numbers in either the total or the count. You may use a different formula for the grade calculation, mine is just an example. We will make all the grades total a maximum of 100 here to simplify our work on the Grade sheet later.

Add some attendance data and watch the grade computation.

Copy this sheet and use it to create sheets for HomeWork, Quiz, and Test. Modify them as appropriate. In example, my sheets are below. Notice that I give ten points for each homework, so the formula for grade is different than for attendance. I give 100 points for quizzes and tests, so that formula is also different. To add sheets remember to right click the sheets tab and choose Insert.

**The Homework Sheet**

	A	B	C	D	E	F	G	H	I
1	Computer Class Spring 2003								
2	HomeWork								
3	Student	Secret Code	6/30	7/7	7/14	7/21	Total	Count	Grade
4									
5	John	Ac123	10	9	10	10	39	4	97.5
6	Mary	Queen3	8	7		9	24	3	80
7	LuAnne	lamaqt	9	7	9	E	25	3	83.33
8	Bill	Payme	9	8	9	8	34	4	85
9									
10									

**The Quiz Sheet**

	A	B	C	D	E	F	G	H	I
1	Computer Class Spring 2003								
2	Quiz								
3	Student	Secret Code	1	2	3	4	Total	Count	Grade
4									
5	John	Ac123	100	95	100	99	394	4	98.5
6	Mary	Queen3	90	80		96	266	3	88.67
7	LuAnne	lamaqt	95	83	97	E	275	3	91.67
8	Bill	Payme	98	92	96	83	369	4	92.25
9									
10									

**The Test Sheet**



	A	B	C	D	E	F	G	H
1	Computer Class Spring 2003							
2	Test							
3	<u>Student</u>	<u>Secret Code</u>	<u>1</u>	<u>2</u>	<u>Total</u>	<u>Count</u>	<u>Grade</u>	
4								
5	John	Ac123	100	95	195	2	97.5	
6	Mary	Queen3	90	80	170	2	85	
7	LuAnne	lamaqt	95	83	178	2	89	
8	Bill	Payme	98	92	190	2	95	
9								
10								

**The Grade Sheet Formulae**

Now we return to the Grade sheet to summarize our grades. Finally we will save the file as a web page. Our grade sheet looks like this:

	A	B	C	D	E	F	G
1	Computer Class Spring 2003						
2							
3	<u>Student</u>	<u>Secret Code</u>	<u>Attend</u>	<u>HW</u>	<u>Quiz</u>	<u>Test</u>	<u>Grade</u>
4							
5	John	Ac123					
6	Mary	Queen3					
7	LuAnne	lamaqt					
8	Bill	Payme					
9							
10							

We need to pull each student's grades from each grading event (Attendance, HomeWork, Quiz, Test) and put them in this sheet for our final calculation and to make a neat summary for viewing. This is simply a matter of entering an “=” to start the formula, then clicking on the Grade in the appropriate sheet for each grading event. After we have done this for the first student, we can copy and paste from that first student's row to the others.

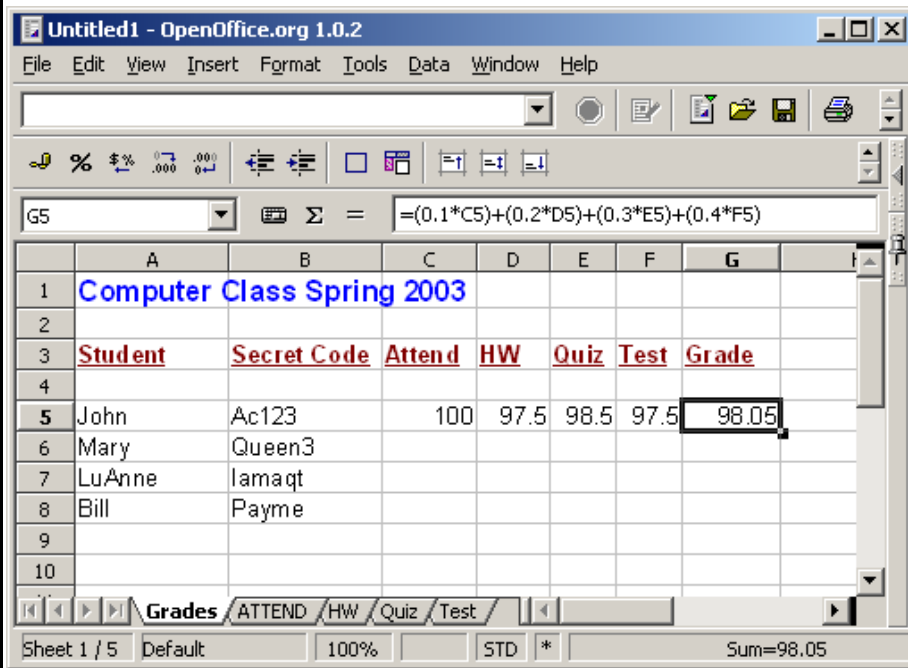
Start in cell C5, then type “=”, then click the tab for the ATTEND sheet and click on the attendance grade for the first student. Finally press ENTER to lock in the formula. Do likewise for the other grading events. You should get something like this:

	A	B	C	D	E	F	G
1	<b>Computer Class Spring 2003</b>						
2							
3	<b>Student</b>	<b>Secret Code</b>	<b>Attend</b>	<b>HW</b>	<b>Quiz</b>	<b>Test</b>	<b>Grade</b>
4							
5	John	Ac123	100	97.5	98.5	97.5	
6	Mary	Queen3					
7	LuAnne	Iamaqt					
8	Bill	Payme					
9							
10							

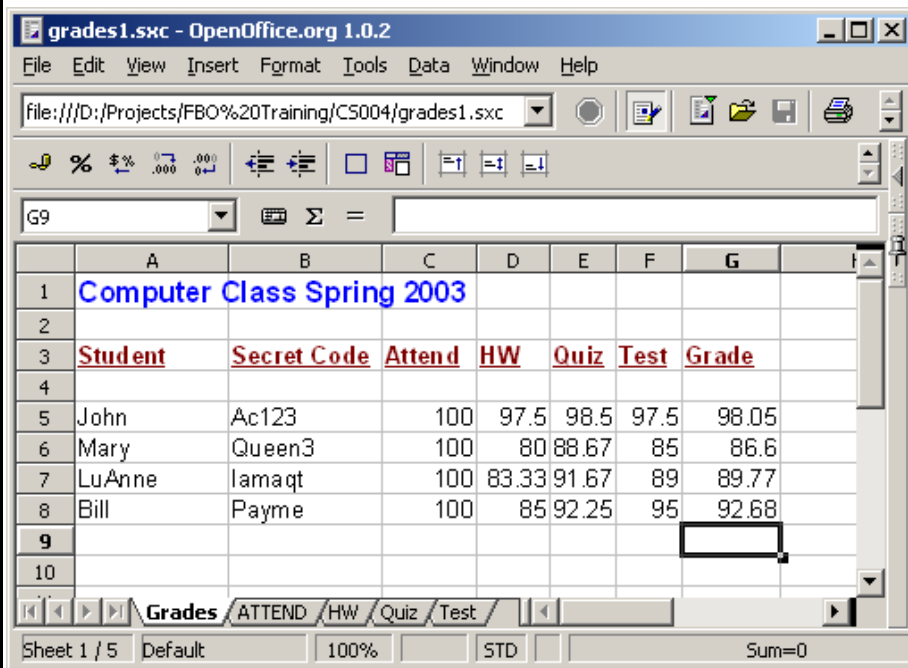
The screenshot shows the OpenOffice.org 1.0.2 interface. The formula bar at the top displays '=Test.G5'. The spreadsheet has tabs for 'Grades', 'ATTEND', 'HW', 'Quiz', and 'Test'. The status bar at the bottom indicates 'Sheet 1 / 5', 'Default', '100%', 'STD', and 'Sum=97.5'.

This is very easy to do. Now figure out what your formula shall be for the grade – including any weights that you use. Since all the grading events use a maximum possible grade of 100, our task is simplified. I will rate attendance as 10%, Homework as 20%, Quizzes as 30%, and Tests as 40%. I'm not suggesting that this is a good weight, but it does make for a good example where you can clearly see the difference in the formulae.

My formula for the grade would then be  $GRADE = (0.10 * ATTEND) + (0.20 * HW) + (0.30 * Quiz) + (0.40 * Test)$ . Entered in the Grade cell for the first student, G5, it looks like this:

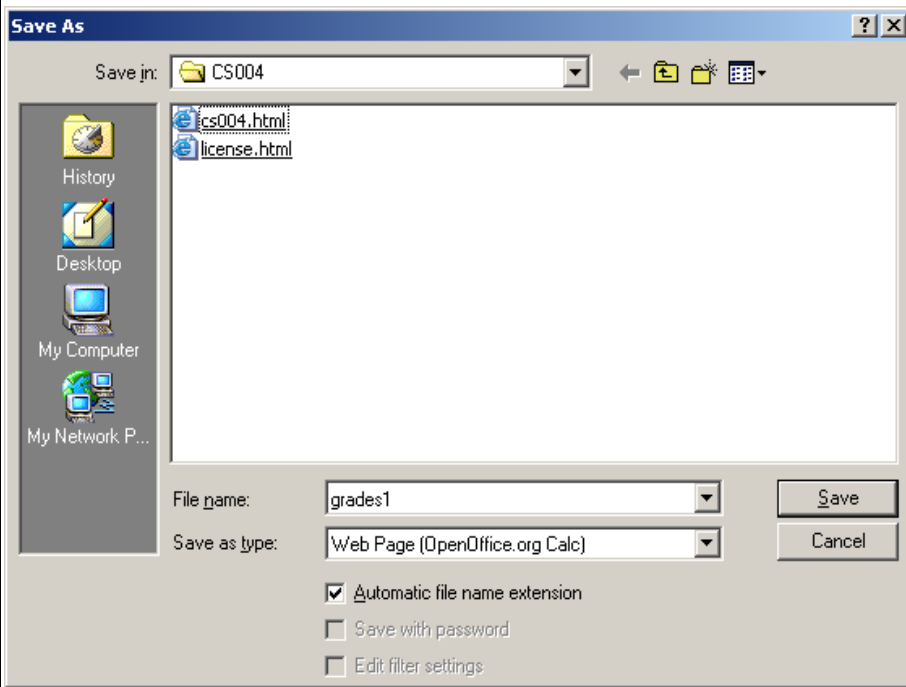


Now all that remains to complete our summary Grade sheet is to copy the first student calculations to the remaining rows. You may wish to save your work. And we get this:



### Saving as a Web Page

Saving the file as a web page is also easy. From the file menu choose SaveAs. In the File Type box select Web Page. Give it a name, preferably 8 letters and numbers with no spaces. Under bars and dashes work fine. A Good Name might be “Grades\_SP2003”.



## Certification Test for CS 2.0 Working Spreadsheets

1.  Start the spreadsheet program
2.  Identify a cell by its column-row designation
3.  Use the spreadsheet for documentation purposes, such as to create a telephone list. This includes:
  - a.  Entering words or phrases into cells
  - b.  Merging the cells of a title line so that they cover the top of the list nicely
  - c.  Editing a cell's contents by using the formula box, pressing F2, or double clicking. Formatting the cell's contents (Bold, Italics, colors, and so forth)
  - d.  Sorting the words in the columns in various useful ways, such as by name, department, or zip code.
4.  Use the Spreadsheet to make a sales chart using a sheet for each region and a sheet to summarize all regions. Include a pie chart of the sales, showing each region in the pie chart.
  - a.  Entering formulas into individual cells by typing and/or clicking.
  - b.  Fixing the references in formulas so that they do not change as the formula is copied to sequential rows
  - c. Place the chart appropriately next to the summary numbers
5.  Use the spreadsheet to construct a cash flow or budget.
  - a)  Income and expenses are listed by week down the left side of the sheet,
  - b)  Months are columns across the top of the sheet.
  - c)  Formulae are used to calculate the tithe(10% of income) and offering (5% of income amounts.
  - d)  Totals update themselves without retyping when any related number is changed: example, changing the income automatically changes the total income, which changes the tithe and offering, which changes the total expenses, which changes the net income.
  - e)  From this sheet identify how much money can be spent each week without affecting the budgeted amount (net income divided by number of weeks).
6.  Save the spreadsheet to disk and diskette in different file formats, such as OpenOffice 1.0 format or Microsoft Excel 95 format, and understand why the file format matters.
7.  Close the program.

Name : \_\_\_\_\_

Street: \_\_\_\_\_

City, State, Zip: \_\_\_\_\_

Phone: \_\_\_\_\_ Todays Date: \_\_\_\_\_

Instructor: \_\_\_\_\_

## Certification Test: Working Spreadsheets 2

1.  Start the spreadsheet program
2.  Use the Spreadsheet to build an amortization schedule with
  - A. the Amount Borrowed, Annual Interest Rate, and Payment Amount variables at the top of the sheet.
  - B. Title the sheet Mortgage Amortization.
  - C. Columns need to be Payment Number, Beginning Balance, Principal Amount, Interest Amount, and Ending Balance.
  - D. Use Edit Fill Series to fill in the payment number column.
3.  Find the best values for payment amount with an initially borrowed amount of \$75,000, and interest rate of 6.5% annually, and 240 payments (20 years, fixed rate).
4.  Find the total interest paid over the life of the loan.
5.  Change the interest rate to 7.5% annually and recalculate the payment amount and total interest paid.
6.  Calculate the amount more interest paid at 7.5% interest than at 6.5% interest.
7.  Determine the effect of paying twice the required payment amount. When is the loan paid off.
8.  Save the spreadsheet to disk and diskette in different file formats, such as OpenOffice 1.0 format or Microsoft Excel 95 format, and understand why the file format matters.
9.  Close the program.

Name : \_\_\_\_\_

Street: \_\_\_\_\_

City, State, Zip: \_\_\_\_\_

Phone: \_\_\_\_\_ Today's Date: \_\_\_\_\_

Instructor: \_\_\_\_\_

Please give this to the instructor so that a certificate may be produced for you.

This is a list of material taught in ALTI classes: some of these are awaiting funding to be transferred into paper documents.

**CS 1.0 Working Small Computers**

Computer Parts; Output Devices; Input Devices; Mouse, Trackball, or Touch Screen; I/O Devices; Printers, PDAs, and other Peripheral Devices; Notebook, Laptop, and Tablet Computers; To Buy or Build Your Own; Starting the computer; Choices in Operating System.

**CS 2.0 Working Computers**

Background of the small computer; choices in Operating System; Startup, Use, and Shutdown of the computer; Parts and function of a Window, moving, re-sizing, minimizing, maximizing, un-maximizing, Workspace Switcher; Main Menu, navigation, games, Desktop Background, Screen Saver; Pop-up Menus.

**CS 10.0 Files**

This is a novice level module required for all students. It discusses computer files, including how they are stored on a computer (physically) and how we think of them (logically). A dismantled hard disk and drawings of the recording schema are used to communicate physical storage (recording) of files. Using the graphical user interface (GUI), files are copied, deleted, undeleted, and moved between folders, on the local computer hard disk and using a Samba ("Windows") network.

**CS 6.0 Formatting Text**

This is a beginner level module required for all students. It demonstrates how to format text using standard GUI controls. The module is intended to be generic enough to apply to most existing office programs including Sun Microsystems's OpenOffice and Microsoft's Office products.

**CS 11.0 Multiple Windows**

This is a beginner level module required for all students. It practices multi-tasking on a personal computer. Several windows are opened and the student practices switching between them using the Task Bar, clicking on the screen, and the ALT-TAB keys.

**CS 4.0 Working Spreadsheets**

Introduction to Spreadsheets. This is a novice level module to help someone who has no experience with spreadsheet programs. The module is intended to be generic enough to apply to most existing spreadsheet programs including Sun Microsystems's OpenOffice and Microsoft's Office products.

**CS 3.0 Working Word Processors**

Introduction to Word Processing. This is a novice level module to help someone who has no experience with word processing programs. The module is intended to be generic enough to apply to most existing word processing programs including Sun Microsystems's OpenOffice and Microsoft's Office products.

**CS 14.0 Working Presentations**

Introduction to Presentation software. This is a novice level module to help someone who has no experience with presentation programs, such as Microsoft Power Point. The module is intended to be generic enough to apply to most existing office programs including Sun Microsystems's OpenOffice and Microsoft's Office products.

**CS 7.0 Internet (including Internet job searches)**

This is a novice level module to help someone who has no experience with Internet browser programs. The module is intended to be generic enough to apply to most existing Internet browser programs including Mozilla Firefox and Microsoft Internet Explorer.

**CS 5.0 E-Mail and Web Mail**

This is a novice level module to help someone who has no experience with e-mail programs. The module is intended to be generic enough to apply to most existing e-mail programs including Ximian's Evolution, Thunderbird, and Microsoft's Outlook and Outlook Express. Others may be added as they come into common use in the business environment.

**CS 8.0 Instant Messaging**

This is a novice level module to help someone who has no experience with Internet Chat programs. The module is intended to be generic enough to apply to most existing Internet Chat programs including Linux GAIM, AOL Messenger, and Microsoft's Messenger.

**CS 9.0 Computer Security**

This is a General level module to help someone with good working knowledge of the computer and computer programs to understand how viruses and other mal-ware infect a computer and spread, what they do to the victim, and how to affect remediation once an infection is detected.