

# Spreadsheets for Geniuses

## Introduction

Spreadsheets make use of the great mathematical powers of the computer. Simply put:

**A Spreadsheet is a computerized ledger that can perform calculations on its data.**

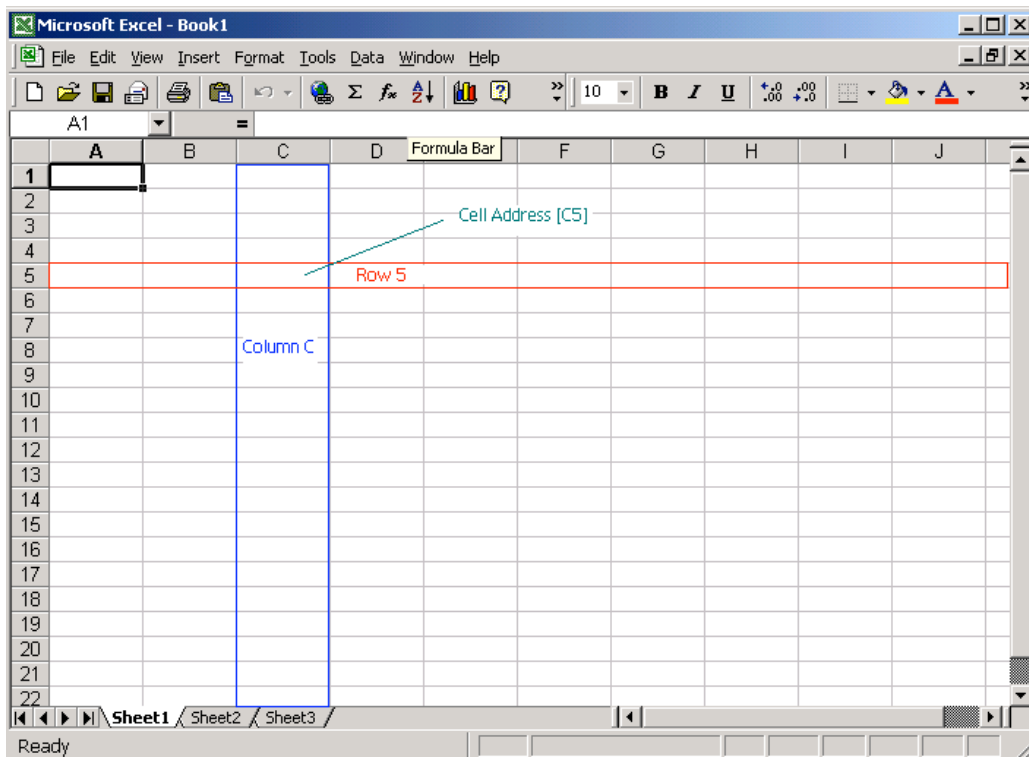
In addition to Microsoft's Excel, there are many different spreadsheet programs. While the functionality of each spreadsheet program is very similar, the features and methods are quite different for performing the same task. All examples in this section will be given using Microsoft Excel.

Important Note:

At first, students may think the methods of creating a spreadsheet to perform calculations is cumbersome. This is NOT TRUE. Spreadsheets are easy to learn and extremely useful. Like anything, becoming proficient with a spreadsheet program takes a little practice. Once a small amount of proficiency is gained, you will begin to see how incredibly handy this tool can be.

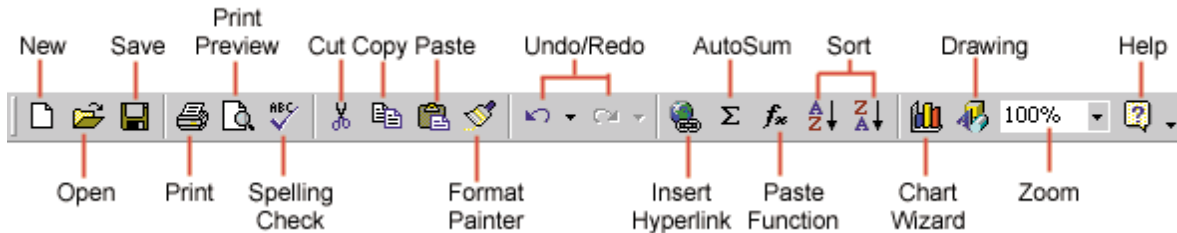
## Excel Overview

The spreadsheet files in Excel are called **workbooks** and can hold several **worksheets**. A worksheet is made up of a grid labeled with letters along the top and numbers down the side. These labels are the gray buttons down the left side and along the top. The intersection of a **column** and a **row** is called a **cell**. The **cell address** is the column letter and the row number (i.e. C5). These cells can contain text, numbers, or mathematical formulas.



## The Standard Toolbar

This toolbar is located just below the menu bar at the top of the screen and allows you to quickly access basic Excel commands.



- **New** - Select **File|New** from the menu bar, press **CTRL+N**, or click the **New** button to create a new workbook.
- **Open** - Click **File|Open** from the menu bar, press **CTRL+O**, or click the **Open** folder button to open an existing workbook.
- **Save** - The first time you save a workbook, select **File|Save As** and name the file. After the file is named click **File|Save**, **CTRL+S**, or the Save button on the standard toolbar.
- **Print** - Click the Print button to print the worksheet.
- **Print Preview** - This feature will allow you to preview the worksheet before it prints.
- **Spell Check** - Use the spell checker to correct spelling errors on the worksheet.
- **Cut, Copy, Paste, and Format Painter** - These actions are explained in the [Modifying A Worksheet](#) section.
- **Undo and Redo** - Click the backward **Undo** arrow to cancel the last action you performed, whether it be entering data into a cell, formatting a cell, entering a function, etc. Click the forward **Redo** arrow to cancel the undo action.
- **Insert Hyperlink** - To insert a hyperlink to a web site on the Internet, type the text into a cell you want to be the link that can be clicked with the mouse. Then, click the Insert Hyperlink button and enter the web address you want the text to link to and click **OK**.
- **Autosum, Function Wizard, and Sorting** - These features are discussed in detail in the [Functions](#) tutorial.
- **Zoom** - To change the size that the worksheet appears on the screen, choose a different percentage from the Zoom menu.

## ***What's the big deal about a spreadsheet?***

What makes a spreadsheet so useful? So what... a ledger on the computer. By way of illustration, I will demonstrate how useful a spreadsheet can be. Let's calculate a Grade Point Average.

Gary is a student at Saddleback Community college with dreams of grandeur... he wants to become a high paid programmer making millions of dollars a year. To do this, he wants to graduate from the University of California at Irvine. But alas, Gary hasn't done a great job as a student, and needs to raise his GPA before admissions at UCI will even look at him. He has been at Saddleback for one semester, and his grades have been poor. He figures that at the end of his fourth semester, he will need at least a 3.25 GPA to be accepted.

### **Calculated Via Paper**

At first, Gary hasn't had computer science 1A, so he knows little about spreadsheets. So, he does everything on paper. He writes out each of his existing grades (substituting the appropriate grade point for the grades), adds them up, and divides them by the number of classes that he has taken thus far. He comes up with a 2.25.

Out of the 12 classes left, he needs to raise his GPA, but he doesn't know how many A's and B's he needs to get. He **guesses** that he can get all B's and still get his 3.25. To verify this, he writes down all of his current grades and the twelve B's that he thinks he needs. He adds them all up and now divides by 16 (the number of classes he will have taken by the end), and finds out that... erg, Gary's new GPA will be 2.8125... This is not enough.

Now, he assumes that he would have to get all A's. So, he erases all of the B's and substitutes A's, Adds them all up (by hand), and then divides by 16. He sees that if he were to get all A's by the end of his stay at Saddleback, he would have a GPA of 3.5625!!! That would surely get him the acceptance, but realistically, Gary likes to hang out with his friends, he thinks he at least wants some life. Gary reasons that a couple of B's will be ok, but how many exactly... let's calculate maximum slack factor.

Gary then begins the arduous process of erasing one A, and replacing it with a B, and then re-calculating the GPA. He does this erase/write/recalculate 5 times until the GPA is just right. He adds up the number of A's and B's until he finds that he now needs 7 A's and 5 B's. By the time he is finished making this calculation, 23 years have passed, and he has little time to graduate from UCI.. Gary needs a quicker method of calculation.

## Calculated Via Spreadsheet

Had Mr. Coleman used a spreadsheet to calculate the GPA, the process would have been far less arduous. Here is what he would have done.

1. Open up Microsoft Excel and enter all of his classes in column B. He separates the classes into Semesters just for show. In Column D, he puts his Grade Point for each grade that he has received thus far.

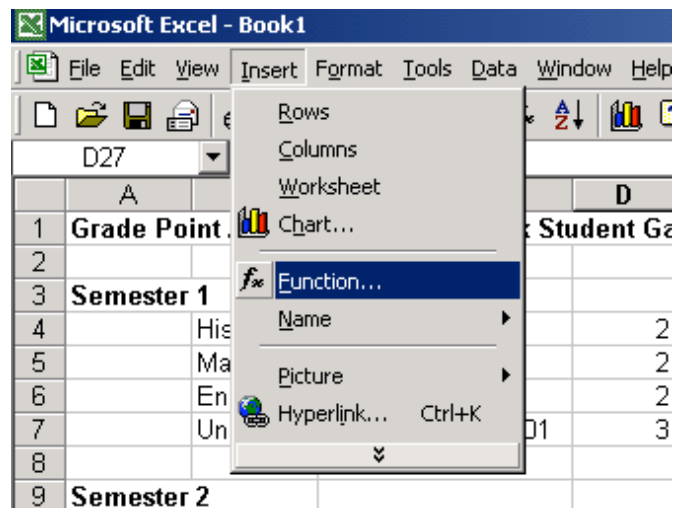
	A	B	C	D	E	F
1	<b>Grade Point Average for Saddleback Student Gary Coleman.</b>					
2						
3	<b>Semester 1</b>					
4		History 1A		2		A=4
5		Math 3A		2		B=3
6		English 1A		2		C=2
7		Underwater Fire Prevention 101		3		D=1
8						F=0
9	<b>Semester 2</b>					
10		CS 1A				
11		Math 3b				
12		English 1B				
13		Underwater CPR 101				
14						
15						
16	<b>Semester 3</b>					
17		CS 1C				
18		Math 3C				
19		BIO 1A				
20		Break Dancing 101				
21						
22	<b>Semester 4</b>					
23		CS 3A				
24		CS 3B				
25		BIO 1B				
26		Clown Makeup 1A				
27						

- Next, Gary would select a cell to calculate his grade point average. He does this by clicking inside of the cell that we wants to be the Selected Cell. In this example, he selects D 27 (Gary can see that the cell is selected because a Black Box surrounds the selected cell).

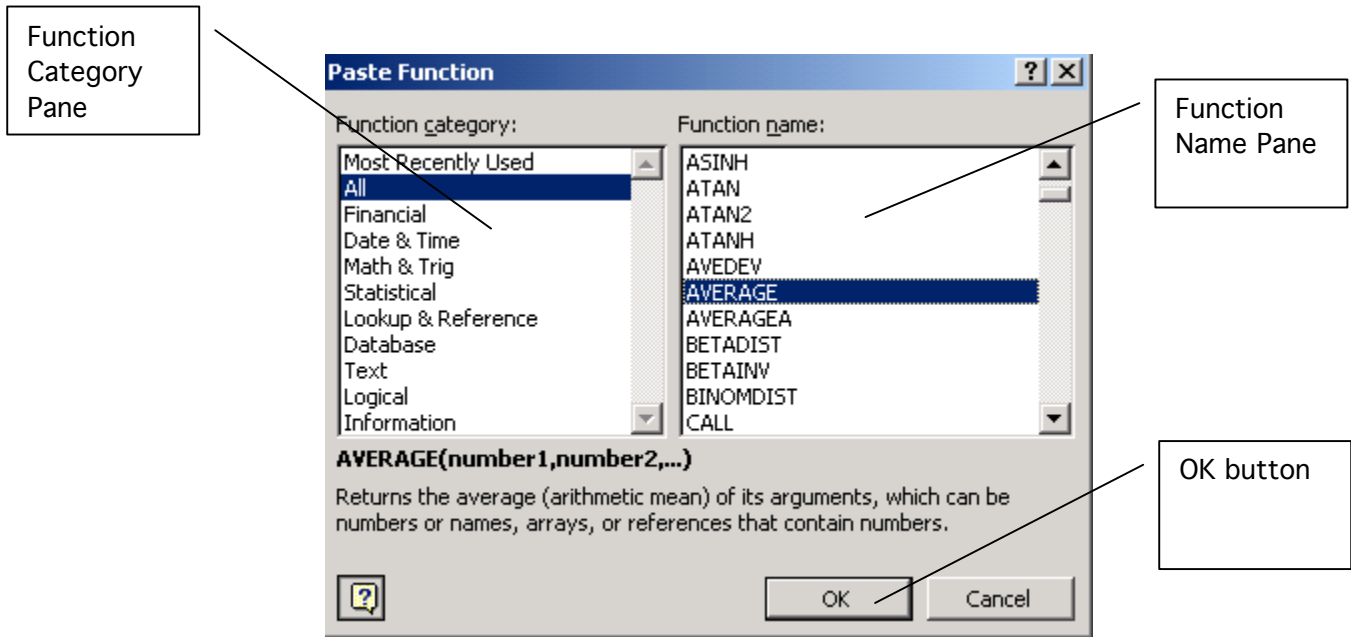
	A	B	C	D	E
1	Grade Point Average for Saddleback Student Gary Co				
2					
3	<b>Semester 1</b>				
4		History 1A		2	
5		Math 3A		2	
6		English 1A		2	
7		Underwater Fire Prevention 101		3	
8					
9	<b>Semester 2</b>				
10		CS 1A			
11		Math 3b			
12		English 1B			
13		Underwater CPR 101			
14					
15	<b>Semester 3</b>				
16		CS 1C			
17		Math 3C			
18		BIO 1A			
19		Break Dancing 101			
20					
21	<b>Semester 4</b>				
22		CS 3A			
23		CS 3B			
24		BIO 1B			
25		Clown Makeup 1A			
26					
27			GPA		

The selected cell

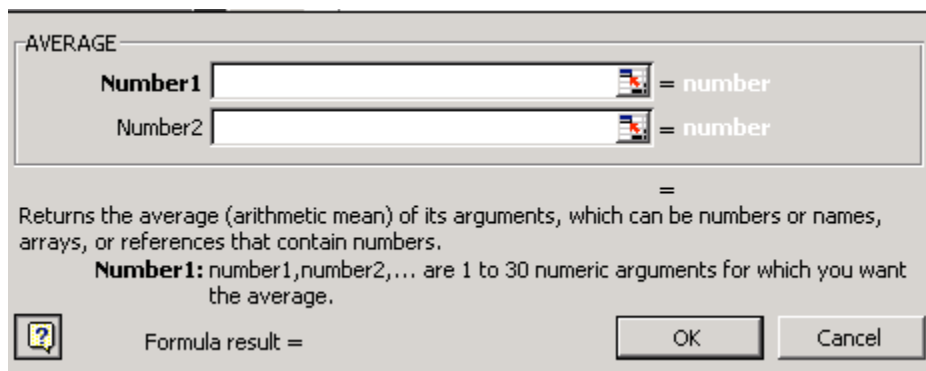
- Now Gary wants to enter a **Calculation**, specifically, he wants to enter the 'Average' function. By selecting a function from the **insert** menu at the top of the program, the results of the function will appear in the selected cell (in Gary's case, D 27). So, Gary selects 'Insert' from the menu, and then selects **Function**.



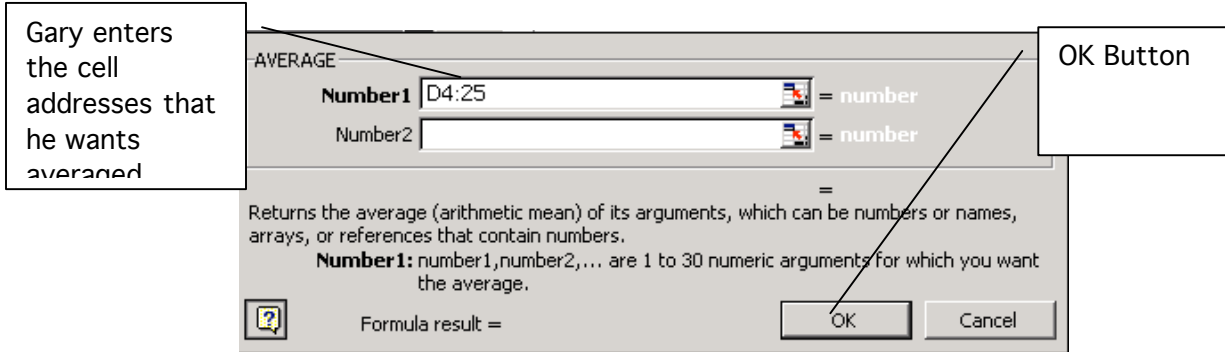
4. Selecting Insert | Function (as in the last step) displays another box called 'Paste Function' (you can see the name of the box in the title bar located in the top blue bar of the box). The function categories are on the left side and the function names are on the right side. For simplicity, Gary selects the 'All' function category. This category will display all of the Functions in the right hand pane (the function name pane). After selecting all from the Function Category Pane, Gary moves to the Function Name Pane and scrolls down to find the Average function. He selects it and selects the OK button.



5. After selecting the OK button, Gary is presented with another box. This is the 'Average' box. It is asking Gary to input the **cell addresses** (see the introduction of this section for clarification) that he wants averaged.



6. In the text box next to the label 'Number1', Gary enters the **cell addresses** that he wants averaged. The first one he wants is D4, the second D5 etc... all the way up to D25. He could enter D4,D5,D6, etc.. all the way up to D25. But, he really wants D4 through D25, so all he really has to enter is D4:D25. To accept this, he selects the OK button.



7. In the cell that Gary originally selected to put the 'Average' function, the result is displayed.

	A	B	C	D
1	<b>Grade Point Average for Saddleback Student Ga</b>			
2				
3	<b>Semester 1</b>			
4		History 1A		2
5		Math 3A		2
6		English 1A		2
7		Underwater Fire Prevention 101		3
8				
9	<b>Semester 2</b>			
10		CS 1A		
11		Math 3b		
12		English 1B		
13		Underwater CPR 101		
14				
15	<b>Semester 3</b>			
16		CS 1C		
17		Math 3C		
18		BIO 1A		
19		Break Dancing 101		
20				
21	<b>Semester 4</b>			
22		CS 3A		
23		CS 3B		
24		BIO 1B		
25		Clown Makeup 1A		
26				
27			<b>GPA</b>	2.25

Average of columns D4 to D25

8. Wow, Gary surmises that he currently has a 2.25 GPA. Cool, Gary can then enter the other grades, in the columns to find out what he needs to get his GPA... Are you ready for the best part? Whenever Gary enters a new grade into the column (in any of the cells that he selected for the average function [see step six]), the average AUTOMATICALLY UPDATES. Just like that... no erasing, no calculators, and Gary gets to keep his Sitcom! He begins to enter the future grades to see which GPA makes a 3.25.

History 1A	2	History 1A	2	<b>1</b>		
Math 3A	2	Math 3A	2	History 1A		2
English 1A	2	English 1A	2	Math 3A		2
Underwater Fire Prevention 101	3	Underwater Fire Prevention 101	3	English 1A		2
				Underwater Fire Prevention 101		3
<b>2</b>		<b>2</b>				
CS 1A	3	CS 1A	3	<b>2</b>		
Math 3b	3	Math 3b	3	CS 1A		3
English 1B	3	English 1B	4	Math 3b		3
Underwater CPR 101	3	Underwater CPR 101	3	English 1B		4
				Underwater CPR 101		4
<b>3</b>		<b>3</b>				
CS 1C	3	CS 1C	3	<b>3</b>		
Math 3C	3	Math 3C	3	CS 1C		3
BIO 1A	3	BIO 1A	3	Math 3C		3
Break Dancing 101	3	Break Dancing 101	4	BIO 1A		3
				Break Dancing 101		4
<b>4</b>		<b>4</b>				
CS 3A	3	CS 3A	3	<b>4</b>		
CS 3B	3	CS 3B	3	CS 3A		4
BIO 1B	3	BIO 1B	4	CS 3B		4
Clown Makeup 1A	3	Clown Makeup 1A	4	BIO 1B		4
				Clown Makeup 1A		4
<b>GPA</b>	2.8125	<b>GPA</b>	3.0625	<b>GPA</b>		3.25

## Excel Exercise 1

In this exercise, you will create a spreadsheet similar to that of Gary's in the above section. The new GPA calculator will have the additional ability to weight the GPA by the number of units that each grade is worth.

### Step1: Create a new Spreadsheet file

- Start Microsoft Excel
- Click in the cell B3. Type "My Grades"
- Enter the following data into the cells below the Title of the Spreadsheet:
  - In Cell B5 enter: Class Name
  - In Cell C5 enter: Units
  - In Cell D5 enter: Grade
  - In Cell E5 enter: Grade Points

Your spreadsheet should look like the following:

	A	B	C	D	E	F
1						
2						
3		<b>My Grades</b>				
4						
5		<b>Class Name</b>	<b>Units</b>	<b>Grade</b>	<b>Grade Points</b>	
6						

### Step 2: Save your file

- Save your file to the H: Drive as in all previous assignments

### Step 3: Enter class data

- Enter the following data... ensure that you are entering the data in the right columns... (under their titles). DO NOT ENTER THE GRADE POINTS for each class, this will be calculated for you.
- NOTE: If you'd like, you may instead enter your own grades and classes.

<b>Class Name</b>	<b>Units</b>	<b>Grade</b>
MATH 2	4	3
CS 1A	3	3
BIO 1A	5	4
CS 1B	3	3
CS 2A	3	2
CS 2B	3	4
MATH 3A	4	3

**Step 4: Save your file**

- Always save your work so that you may retrieve it.

**Step 5: Compute Grade Points for the MATH 2 Class**

- Select the 'Grade Points' cell in the Math 2 row (E6).
- Type in the following formula exactly as written:

$$=C6*D6$$

- Press the 'Enter' key on the keyboard. Note that the Grade Point cell for the Math 2 class has been filled in with 12, the value of  $4*3$ !!

Your spreadsheet should now look like the following:

	A	B	C	D	E
1					
2					
3		<b>My Grades</b>			
4					
5		<b>Class Name</b>	<b>Units</b>	<b>Grade</b>	<b>Grade Points</b>
6		MATH 2	4	3	12
7		CS 1A	3	3	
8		BIO 1A	5	4	
9		CS 1B	3	3	
10		CS 2A	3	2	
11		CS 2B	3	4	
12		MATH 3A	4	3	
13		MATH 3B	4	2	
14					
15					

**Step 6: Save your work****Step 7A: Compute the Grade Points for each class**

- Following the instructions in step 5, compute the Grade Points for each of the classes. In the Grade Point Column (column E) for each class, type the formula as written above, for example, for Classes CS 1A, BIO 1A, CS 1B:

$$=C7*D7$$

$$=C8*D8$$

$$=C9*D9$$

.

**YOUR SPREADSHEET SHOULD NOW LOOK LIKE THE FOLLOWING:**

	A	B	C	D	E	F
1						
2						
3		<b>My Grades</b>				
4						
5		<b>Class Name</b>	<b>Units</b>	<b>Grade</b>	<b>Grade Points</b>	
6		MATH 2	4	3	12	
7		CS 1A	3	3	9	
8		BIO 1A	5	4	20	
9		CS 1B	3	3	9	
10		CS 2A	3	2	6	
11		CS 2B	3	4	12	
12		MATH 3A	4	3	12	
13		MATH 3B	4	2	8	
14						

**Step 7B: Compute the Grade Points for each class (The fast way)**

- Click in cell E6. Pull down the Edit Menu and select copy. A moving border will surround cell E6, indicating that its contents have been copied to the clipboard.
- Click in cell E7, and drag the mouse down to E13, thus selecting the range of cells:

	A	B	C	D	E	F
1						
2						
3		<b>My Grades</b>				
4						
5		<b>Class Name</b>	<b>Units</b>	<b>Grade</b>	<b>Grade Points</b>	
6		MATH 2	4	3	12	
7		CS 1A	3	3		
8		BIO 1A	5	4		
9		CS 1B	3	3		
10		CS 2A	3	2		
11		CS 2B	3	4		
12		MATH 3A	4	3		
13		MATH 3B	4	2		
14						

- **PULL DOWN THE EDIT MENU AND SELECT PASTE. NOTE THE GRADE POINTS FILLING IN FOR THE REST OF THE CLASSES.**

### Step 8. Save your work.

### Step 9: Sum the Units

- Select B15, type  
**Sum:**
- Select C15, type  
**=Sum(C6:C13)**
- Note that the rows in Column C have been summed.

### Step 10: Sum the Grade Points

- Follow the method in Step 9 for summing the Grade Point column. You didn't think I was just going to show you everything... did you?

### Step 11: Compute the GPA

- Select cell D17 and type GPA
- The GPA computation divides the Summation of the Grade Points by the Summation of the Units. We have computed these two values already... now, we need to finish the computation: In E17, Type the following:

$$=E15/C15$$

### Step 10: Just for fun...

- Woohoo!! Isn't this a hoot. Now, just for kicks.. change some of the initial values... the Grades and the Units they are worth... you will see that the calculations automatically update. I used to keep a Spreadsheet of my grades at

Saddleback as I went through this program. About mid semester, I would have an idea what my grades might be, so I plunked them in to check out what my new GPA was going to be. Pretty Enlightening.

Your final Spreadsheet should look like the following:

	A	B	C	D	E	F
1						
2						
3		<b>My Grades</b>				
4						
5		<b>Class Name</b>	<b>Units</b>	<b>Grade</b>	<b>Grade Points</b>	
6		MATH 2	4	3	12	
7		CS 1A	3	3	9	
8		BIO 1A	5	4	20	
9		CS 1B	3	3	9	
10		CS 2A	3	2	6	
11		CS 2B	3	4	12	
12		MATH 3A	4	3	12	
13		MATH 3B	4	2	8	
14						
15		Sum:	29	Sum:	88	
16						
17				GPA	3.03448	
18						
19						

You have finished this Exercise.