



Spreadsheet Basics

Working with numbers

What is a Spreadsheet

- ❖ Digital version of the old paper accounting spreadsheets
- ❖ A spreadsheet is a grid of columns and rows which is used primarily for numerical calculations, but also may be used as a data management tool



	A	B	C	D	E
1					
2					
3					
4					
5					
6					
7					
8					

Terms

Spreadsheet

The diagram shows a grid with columns A-E and rows 1-9. A horizontal line across row 2 is labeled 'Row'. A vertical line down column C is labeled 'Column'. The intersection of column C and row 4 is labeled 'Cell'. A rectangular area from column C to E and row 6 to 8 is labeled 'Range'. At the bottom, a tab labeled 'Worksheets' is shown with 'Sheet1', 'Sheet2', and 'Sheet3' visible.

- Row - Horizontal breakdown (numbered)
- Column - Vertical breakdown (lettered)
- Cell - where column & row intersect (referred to by column & row)
- Range - rectangular area
- Worksheets - 3rd dimension to spreadsheet

More Terms

- ❖ **NUMBERS** - Any number entered into a spreadsheet.
- ❖ **VALUE** - Any formula or function or number that yields a numeric value.
- ❖ **TEXT or LABEL** - Characters and/or numbers entered to identify parts of spreadsheet or to add documentation. Or to enter other needed data
- ❖ **FORMULA** - Mathematical or other relationships created between cells. EXAMPLE: =A1+B1 may be a formula in cell C1
- ❖ **FUNCTIONS** - Built-in shortcuts that help the user perform complex computations.
- ❖ **FORMAT** - Style in which values or text appear including:
 - fonts: typefaces, size, bold italic, color
 - numeric styles: currency, percent, e-notation, fixed decimal places, date, time
 - alignment: left, right, justified, centered, centered across columns, vertical placement



Building formulas

- ❖ Formulas are the backbone of spreadsheets
- ❖ Formulas are similar to equations used in algebra but instead of using letters (x, y, z) for variables we use cell references (A1, A2, A3).
- ❖ All formulas start with an equal sign =
- ❖ Formulas often use mathematical operations



Symbols used in Formulas

+	Addition
-	Subtraction
*	Multiplication
/	Division
^	Exponentiation
()	Order of operation

If no order is specified. Exponentiation occurs first, followed by multiplication/division and last addition/subtraction.

Cell References

If the information is elsewhere in the spreadsheet NEVER re-type the information.

Refer to Cells

	A	B
1	Sales	\$ 10,567.00
2	Expenses	\$ 8,452.00
3	Net Income	=B1-B2
4		

The answer to the formula will appear in cell B3 after the formula is entered

KEY CONCEPT

❖ The key to building successful formulas and hence successful spreadsheets is to

Refer to Cells

❖ when the information exists in another cell
 ➤ Also consider storing numbers in a separate cell if needed in more than one formula then refer to that cell.

Code for next software assignment-
Refer to cells

Formatting

Character Formatting	Number Formatting	Cell Formatting
<ul style="list-style-type: none"> • Bold • <i>Italics</i> • Fonts • Size • Color 	<ul style="list-style-type: none"> • Currency • \$1234.56 • Percent • 10% • General • 1234 • Fixed Decimal • 12.567 • Date • 1/21/2009 • Time • 11:00am 	<ul style="list-style-type: none"> • Alignment • Left • Right • Centered • Merge & center • Background color

Functions

❖ A **function** is a short cut to a longer formula or may add additional functionality.

➤ **Sum** - allows us to total a range

▲ To total cells from A3 to A10, use the function =sum(A3:A10).

➤ **Maximum** – returns maximum value in range

▲ max(range)

➤ **Minimum** – returns minimum value in range

▲ min(range)

➤ **Average** – returns average value in range

▲ average(range)

Formulas

❖ Not all formulas need a function

❖ Calculate percentage – divide whole into part.

	A	B
1		
2	My score	25
3	Total Points	30
4	Percent	=B2/B3

❖ Do NOT place a normal calculation inside a Sum function

➤ =SUM(C5*D3/D7) - Incorrect

➤ =C5*D3/D7 - Correct

❖ Functions can be part of a formula

➤ =sum(A3:A350)/2

Effective use of Sum function

❖ Use the sum function only when you need to add more than two cells in a range.

❖ Do not add each individual cell - Use the SUM function with a range!

➤ =B2+B3+B4+B5+B6 - Inefficient

➤ =sum(B2,B3,B4,B5,B6) - Inefficient

➤ =sum(B2:B6) Correct!

	A	B
1		
2	Assignment 1	35
3	Assignment 2	45
4	Assignment 3	50
5	Assignment 4	75
6	Assignment 5	30
7		=SUM(B2:B6)

Effective use of Sum function

- ❖ Specifying a range allows one to insert or delete rows anywhere between the start and ending rows of the range without adjusting the formula.



Absolute and Relative cell references

- ❖ When a formula is copied the cell references in the formula change relative to the new location. This is called *relative cell referencing*.

	A	B
1		
2	=A5+C6	=B5+D6
3	=A6+C7	

- ❖ Sometimes we don't want a cell reference to change when we copy it. *Absolute cell referencing* keeps the cell reference absolutely the same.

➤ represented by \$ in formula and can be achieved by pressing F4 after typing in the cell reference.

	A	B
1		
2	=A\$5+C6	=B\$5+D6
3	=A\$5+C7	



Hands-on Training

[Spreadsheet Basics](#)





Formulas & Functions

Creating Spreadsheets

Creating a spreadsheet

- ❖ Plan it out!
- ❖ Think about what task you need to accomplish
 - What data needs to be input
 - How should the data be labeled
 - What calculations need to be performed
 - What formulas can best perform those calculations
 - Is there any data needed for formulas that can be stored in a cell for referencing



Example: Grades

- ❖ You want to know what your grade is throughout the course
- ❖ What data needs to be input
 - List of assignments
 - Total possible points for each assignment
 - My Score
- ❖ How should the above data be labeled
 - Assignments
 - Total Points
 - My Score



Example (cont.)

- ❖ What calculations need to be performed
 - Calculate total possible points
 - Calculate total points earned
 - Calculate a percent
- ❖ What formulas can best perform those calculations
 - Calculate totals is an addition formula
 - ▲ More than two cells in range - Use SUM function
 - ▲ Percent part divided by whole



Building Spreadsheet

- ❖ Enter labeling
- ❖ Build the formulas
- ❖ Enter data
- ❖ Copy formulas as needed
- ❖ Format appropriately
- ❖ Update as needed



Example: Entering Labeling

- ❖ Open the *Grades.xlsx* from *ICS101Assignments/exercises* folder
- ❖ Some of the labels have been entered already.
- ❖ In cell C3 – enter *My Points*
- ❖ In cell D3 – enter *Percent*
- ❖ In cell D19 – enter *Totals*



Building Formulas

- ❖ Many formulas are based on mathematical equations.
 - Use +, -, *, /, ^
 - Be sure to indicate order if necessary ()
- ❖ If there is a function to simplify a calculation use the function
- ❖ Not all formulas need a function.
 - Don't use a function if it isn't needed
- ❖ The sum function is for adding cells **ONLY**
 - Do NOT place a formula in the sum function

Formulas - REFER TO CELLS

- ❖ Most important concept!
- ❖ If data is contained elsewhere in a spreadsheet, do NOT type in the data. Refer to cells!
 - NEVER RETYPE NUMBERS
- ❖ For data used more than one formula, store in a cell.
 - If the amount changes, it is simple to update the changes.

Formulas - REFER TO CELLS

- ❖ Is relative or absolute referencing needed?
 - Will any of the formulas be copied?
 - What cells need to remain absolutely the same when copied, then use absolute cell reference
- ❖ When referring to cells on another sheet, include the sheet name followed by !
 - Example: Sheet1!C3
- ❖ Code for this lesson "Refer to Cells"

Example: Formulas

- ❖ Calculate Percent for each assignment
 - Part divided by the whole.
 - ▲ Part is My Score
 - ▲ Whole is Total Points
 - Is absolute cell reference needed?
 - ▲ Will be copy this – Yes
 - ▲ Does any Cell need to remain the same? – NO
 - ▲ No absolute cell referencing needed.
 - D4 – Create formula

Using Functions

- ❖ A function can be a shortcut for a more complex formula.
 - For instance: when summing numbers, one could add each cell. =A1+A2+A3+.....+A575
 - ▲ Takes too long!
- ❖ The function Sum allows us to total a range =sum(A1:A575)
- ❖ Functions consist of a function name and parameters set in parenthesis if more than one parameter is needed the parameters are separated by commas

Example: Function & copying

- ❖ Calculate the totals:
 - Sum needed for total points
 - ▲ B19 – click on Sum icon
 - Is any absolute cell referencing needed?
 - ▲ Will it be copied – Yes
 - ▲ Does any cell need to remain the same - NO
- ❖ Copy formulas
 - Copy B19 to C19
 - Use Quick fill button to Copy D4 down through D19

Example: Error checking

- ❖ I know the total score for the class is 600 pts.
- ❖ Totals is showing 540 – something's missing
 - Must be something worth 60 points
 - Computing topic report!
- ❖ Insert a row between Mini-Exam: Word processing & Software Assignment Access
- ❖ Enter label & total points.
 - Notice change in sum

Example: Enter Data

- ❖ Go to Laulima: Tasks, tests & surveys
- ❖ Fill in scores from assignments
 - Software
 - Learning exercise scores are all lumped in at the bottom of the spreadsheet.

Common Functions

- ❖ ABS(value or cell) - Returns absolute value
 - For negative values this yields a positive value.
- ❖ ROUND(value or cell, number of decimal places) - Rounds number to specified decimal places.
 - Round above other than decimal specify a negative number for the decimal places parameter
 - ▲ EXAMPLE: to round cell B5 to the thousands place
 - =ROUND(B5,-3)
 - NOTE: Formatting can make numbers appear rounded, but it does not change the value calculated.

More Functions

- ❖ PMT(interest, term, principal) - Returns a payment for a loan given the specified interest, term and principal
 - If calculating monthly payments, divide annual interest by 12.
 - Term is the number of payments.
 - ▲ 60 month loan is 60.
 - ▲ 20 year loan is 240 (20 years times 12 months)
- ❖ IF(condition, ifyes, ifno) - Provides a conditional return.
 - if the condition is met, the if yes parameter is returned otherwise if no parameter is

Embedding Functions

- ❖ Embedding or nesting of functions - placing one function inside another.
 - Example: =Round(PMT (B1/12,B2,B3),2)
- ❖ Functions can also be embedded in a more complex formula
 - Example: =Sum(A5:A95)*B4+(B59/C3)

Example: More Formulas

- ❖ We want a running percent in column E
 - Enter a new label in E3
- ❖ Running percent
 - We need to sum total points & my score assignments completed so far and divide.
 - More complex formula
 - ▲ In E5 =sum(C4:C5)/sum(B4:B5)
 - Is any absolute cell referencing needed?
 - ▲ Will the formula be copied – Yes
 - ▲ Do any of the cells need to be absolute cell referencing - YES, the first cells in both sums

If Formula

- ❖ Are you going to pass?
- ❖ We need an IF formula
 - If my accumulative percent in D20 is greater than 60% then I pass, else I fail
 - In D21 enter if formula
 - ▲ Condition $D20 > .6$
 - ▲ If yes "PASS!"
 - ▲ If no, "fail"



Training

- ❖ Video training & extra practice should be completed.
- ❖ Might need to continue in next class which has shorter lesson and training.





Spreadsheet Charts

A picture's worth a thousand words

Charts (also called Graphs)

- ❖ Convey information visually.
 - Quicker to perceive comparisons
- ❖ Represent numbers visually
 - A picture is worth a thousand words
 - ..but a picture without words is meaningless -- be sure to label your charts
- ❖ Charts update automatically when numbers are changed.

In the next project you will be asked to enter a code for this lesson. The code is **Labels**. Make note of it.



Charts should contain

- ❖ Labels
 - horizontal (X) & vertical (Y) axis labels
 - Titles
- ❖ Data series portrayed graphically
- ❖ Legends explaining the graph



- ❖ Charts may also contain
 - Annotations
 - Other images



Designing a Chart

- ❖ Keep it simple
- ❖ Decide which information to convey
- ❖ Decide how the information should be presented:
 - Select the most appropriate type of chart
 - Most spreadsheets can show the same information in two aspects
 - ▲ Series in rows
 - ▲ Series in column



Types of Charts

- ❖ Many different types of charts are available which will help convey the information

❖ Bar & column



❖ Area



❖ Stacked Column



❖ Pie



❖ Line



- ❖ And many more

Specifying the correct data

- ❖ Include only the data needed

- Don't include totals if comparing individual amounts (most often for column/bar, line, area types)

- Select only totals if comparing only the totals (most often for pie charts) but don't include individual amounts or the grand total.

	A	B	C	D	E
1	Crazy Computer Sales				
2		January	February	March	Total
3	CR2201	\$ 45,565	\$ 45,250	\$ 47,500	\$ 138,315
4	CR2202	\$ 35,775	\$ 30,500	\$ 38,500	\$ 104,775
5	CR2203	\$ 47,800	\$ 25,675	\$ 48,775	\$ 122,150
6	CR2204	\$ 35,800	\$ 4,800	\$ 55,500	\$ 95,300
7	CR2205	\$ 67,450	\$ 53,450	\$ 70,750	\$ 191,650
8	Total	\$ 230,790	\$ 159,675	\$ 261,025	\$ 651,490

	A	B	C	D	E
1	Crazy Computer Sales				
2		January	February	March	Total
3	CR2201	\$ 45,565	\$ 45,250	\$ 47,500	\$ 138,315
4	CR2202	\$ 35,775	\$ 30,500	\$ 38,500	\$ 104,775
5	CR2203	\$ 47,800	\$ 25,675	\$ 48,775	\$ 122,150
6	CR2204	\$ 35,800	\$ 4,800	\$ 55,500	\$ 95,300
7	CR2205	\$ 67,450	\$ 53,450	\$ 70,750	\$ 191,650
8	Total	\$ 230,790	\$ 159,675	\$ 261,025	\$ 651,490



Two Perspectives

❖ Data can be shown different ways

	A	B	C	D
1		January	February	March
2	CRZ201	\$ 45,565.00	\$ 43,250.00	\$ 47,500.00
3	CRZ202	\$ 35,775.00	\$ 40,500.00	\$ 38,500.00
4	CRZ203	\$ 47,000.00	\$ 25,675.00	\$ 48,775.00
5	CRZ204	\$ 35,000.00	\$ 48,000.00	\$ 55,500.00
6	CRZ205	\$ 67,459.00	\$ 53,450.00	\$ 70,750.00

➤ Row-wise



➤ Column wise



Software Assignment – Excel 1

❖ Next class is software assignment – Excel 1

❖ Be prepared

- Complete the training before the next class
- Review notes for the concepts
- Re-watch the videos to review the skills

❖ During software assignments:

- No talking or getting help from other students
- You may ask the teacher for help
- You may look at the notes & videos





Managing Spreadsheet Data

and working with long sheets

Locking Titles

- ❖ Column and/or row titles can be locked
- ❖ Allows titles to remain in place while scrolling
- ❖ Position cursor in the cell after the titles
 - If spreadsheet has just column titles, click in the cell in first column on the row just below the titles
 - If spreadsheet has just row titles, click in the cell in first row in column just left of the titles
 - If both columns & row title click in the first data cell after the titles



Split Screen

- ❖ Splits the screen so that two parts of the same spreadsheet can be viewed at once.
- ❖ Allows for independent scrolling of sections



Sorting Data

- ❖ Sort list by particular columns
- ❖ Sort order
 - Ascending
 - ▲ A-Z
 - ▲ Start at lowest number
 - ▲ Start at earliest date
 - Descending (opposite of ascending)
- ❖ Create multiple levels of sorts



Data Filters

- ❖ Shows only the rows specified by the filter
- ❖ Autofilter (easiest to use)
 - Filters using a column heads.
 - Select Data contained in column
 - Top ten
 - Custom
 - Boolean logic (AND / OR)
 - Blanks
 - Non blanks



Data Summaries

- ❖ List must be sorted first on categories to be summarized
- ❖ Various columns can be summarized
 - Sum, Average, Count, Max Min, etc.
- ❖ Subtotal function can be automatically inserted
- ❖ Details can be hidden and just summaries shown



What If Analysis

❖ What if Analysis

- Allows us to vary and compare data

❖ Methods

➤ What If - Table

- ▲ Produces a matrix of varying data along horizontal and vertical, and fills in data answers to varying the data

➤ What If - Goal Seek

- ▲ Input the desired amount and indicate which cell to vary

In the next assignment you will be asked to enter a code for this lesson. The code is **What If Table**. Make note of it.

More Functions

❖ vlookup (lookup item, range to look in, column)

- Looks vertically through a range to find the lookup item in the left hand column of the range.
- Yields the contents of a cell in the same row in the column you specify.
- Lookup item – refer to the cell that contains the item you wish to look up.
- Range to look in – refer to the range you wish to search
- Column – a number greater than 1 which is the column of the range from which the data is needed. The lefthand column is 1, the next column over is 2.

❖ hlookup (lookup item, range to look in, row)

- Similar to Vlookup but looks horizontally looks at top row

More Functions (cont).

❖ rand ()

- Yields a random decimal number between 0 and 1
- Multiply by a number to yield a number larger than 1
 - ▲ For a random number between 0-10
 - ▲ Multiply by 10
 - ▲ Round to 0 decimal places
 - =round(rand()*10,0)

❖ randbetween(low number, high number)

- similar to rand, but yields a random number between and including the low and high numbers specified