



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 3 is labeled 'Row'. A vertical line down column 3 is labeled 'Column'. The intersection of row 4 and column 3 is labeled 'Cell'. A rectangular area from row 6 to 8 and column 3 to 5 is labeled 'Range'. The word 'Worksheets' is written at the bottom of the grid.

- 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. Just

Refer to Cells

Also consider storing numbers in a separate cell if needed in more than one formula then refer to that cell.

Example

| | 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

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 for a formula or adds 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!

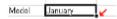
| | A | B |
|---|--------------|-------------|
| 1 | | |
| 2 | Assignment 1 | 35 |
| 3 | Assignment 2 | 45 |
| 4 | Assignment 3 | 50 |
| 5 | Assignment 4 | 75 |
| 6 | Assignment 5 | 30 |
| 7 | | =SUM(B2:B6) |

- =B2+B3+B4+B5+B6 - Inefficient
- =sum(B2,B3,B4,B5,B6) - Inefficient
- =sum(B2:B6) Correct!

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.

Excel's Automatic Fill

- ❖ Click on cell B2
- ❖ Move the cursor to the dot at the right bottom corner of cell B2.
- ❖ The cursor should look like +. Click and drag the dot to the right 2 cells. 
- ❖ When you release the mouse, Excel should show February and March in cell C2 & D2 
- ❖ Click on Cell A3 and drag the dot down to cell A7. This will fill in the computer models in sequence from CRZ201 to CRZ205 

Formula Bar

- ❖ Select cell E3 by clicking on it.
- ❖ Look above the column labels to see the formula bar. This shows the actual formula that is in the cell, while the cell shows the amount.

| E3 | | | | | =SUM(B3:D3) | | | | |
|----|------------------------------|--------------|--------------|--------------|---------------|--|--|--|--|
| | A | B | C | D | E | | | | |
| 1 | Crazy Computer Company Sales | | | | | | | | |
| 2 | Model | January | February | March | | | | | |
| 3 | CRZ-2010 | \$ 45,565.00 | \$ 43,250.00 | \$ 47,500.00 | \$ 136,315.00 | | | | |
| 4 | CRZ-2020 | \$ 35,775.00 | \$ 30,500.00 | \$ 38,500.00 | \$ 104,775.00 | | | | |
| 5 | CRZ-2030 | \$ 47,000.00 | \$ 35,675.00 | \$ 48,775.00 | \$ 131,450.00 | | | | |

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 | =\$A\$5+D6 |
| 3 | =\$A\$5+C7 | |

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

- ❖ 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 data be labeled

Example (cont)

- ❖ What calculations need to be performed
 - Calculate total possible points
 - Calculate total points earned
 - Calculate percents
- ❖ 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
- ❖ Is there any data needed for formulas that can be stored in a cell for referencing

Building Spreadsheet

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

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"

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

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)

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.



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



Types of Charts

- ❖ Many different types of charts are available which will help convey the information
- ❖ Bar & column charts
- ❖ Area charts
- ❖ Stacked Column charts
- ❖ Pie charts
- ❖ Line charts
- ❖ And many more



Designing a Chart

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

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



Designing a Chart (cont)

- ❖ Include only the information 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 | CRZ201 | \$ 45,565 | \$ 45,250 | \$ 47,500 | \$ 138,315 |
| 4 | CRZ202 | \$ 35,775 | \$ 38,500 | \$ 38,500 | \$ 112,775 |
| 5 | CRZ203 | \$ 47,000 | \$ 25,675 | \$ 48,775 | \$ 121,450 |
| 6 | CRZ204 | \$ 35,000 | \$ 4,800 | \$ 55,500 | \$ 95,300 |
| 7 | CRZ205 | \$ 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 | CRZ201 | \$ 45,565 | \$ 45,250 | \$ 47,500 | \$ 138,315 |
| 4 | CRZ202 | \$ 35,775 | \$ 38,500 | \$ 38,500 | \$ 112,775 |
| 5 | CRZ203 | \$ 47,000 | \$ 25,675 | \$ 48,775 | \$ 121,450 |
| 6 | CRZ204 | \$ 35,000 | \$ 4,800 | \$ 55,500 | \$ 95,300 |
| 7 | CRZ205 | \$ 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 | \$ 4,800.00 | \$ 55,500.00 |
| 6 | CRZ205 | \$ 67,459.00 | \$ 53,450.00 | \$ 70,750.00 |

➢ Row-wise

➢ Column wise





Managing Spreadsheet Data

and working with long sheets

Tools for Long Worksheets

- ❖ Locking Titles
- ❖ Split Screen
- ❖ Sorting Lists
- ❖ Data Filters
- ❖ Data summaries



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 ascending or descending order
- ❖ 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

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.

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

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.