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: Enter Labels
- Open the file Grades.xlsx from ICS101Assignments/exercise folder.
- Enter labels
  - Good practice to identify spreadsheet in A1
- 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”

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: Build 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
- Format as percent

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
    - No absolute referencing needed
- 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

**More 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 (cont)**

- 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)

**Improving Spreadsheet**

- Sometimes, more information is needed from a spreadsheet.
- Adjustments need to be made
- More formulas need to be created
Example: Complex Formula

- We want a running percent in column E
- Enter a new label in E3

Build 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 function

- 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”

Hands on training

- Formulas Training
  - Additional practice needs to be turned in
  - Might need to continue into next class session