Spreadsheets 2

Lecture Set 13

Building in Stages

- Build formula in stages
  - Use cells to hold parts of the equation
  - Makes it easier to build complex equation
- Consider amortized loan formula:

$$P = R((1-(1+(r/n))\text{^}-nt)/(r/n))$$

  - Start by identifying the inputs and the result
  - Inputs P, r, n, t
  - Solve for R
    - Let's also compute R_{total} and total interest

Spreadsheet Layout

- Start by labeling input cells
  - "Inputs" (bold, underline, center)
  - Principal, Length of Loan, Payments per Year, Interest Rate
    - Make the column bigger
    - Right-align the labels
- Identify the output cell
  - "Outcome" as above
  - Payment

Sub-Formulas

- Hint – to the right (e.g., column D), use cells for sub-formulas (label in E)
  - Makes calculation easier when formula is complex
    - D3 r/n = B6/B7
    - D4 nt = B7*B5
    - D5 1+rn = 1 + D3
    - D6 ^-nt = D5^(-D4)
    - D7 1- = 1- D6
    - D8 /(r/n) = D7/D3
    - B10 B4/D8
  - How about Rtotal and total interest?
    - B11 = B4*D4
    - B12 = B11-B10

Example Formula Layout

	A	B	C	D	E
1					
2					
3	**Inputs**			=B6/B7	r/n
4	Principal			=B7*B5	nt
5	Length of Loan			=D3+1	1+r/n
6	Interest Rate			=D5^(-D4)	^-nt
7	Payments each Year			=1-D6	1-
8				=D7/D3	/(r/n)
9	**Outcome**				
10	Payment	=B4/D8			
11	Total Paid	=B10*B7*B5			
12	Total Interest	=B11-B4			

Plug in Numbers!

- Plug in numbers and see what happens
  - Initially, spreadsheet displays "error"
  - As we fill in numbers, cells are calculated
- Different scenarios, different numbers!
  - Suppose we want to borrow $20,000 for a car at 4.5%
    - We can try different lengths of time for the loan and see what happens to the payment!
    - Try 3 years, how about 5 years?
- Homework asks you to create a similar spreadsheet for Regular Savings
  - Place a long description above about what the scenario is
    - E.g., "I'm going to save $150 a month at 3%, how much will I have in 5 years?"

Copy & Paste

- So you set up one scenario but we want 3
  - Select the cells holding your formulas and labels
  - "Copy"
  - Move the cursor a few cells below your last cell
  - "Paste"
- Notice that the formulas are copied too
  - All cells referenced by the formulas are "adjusted" to refer to the same relative cell
  - Sometimes we don't want copied formulas to refer to "adjusted" locations
    - You can "lock" a reference in a formula to a row or column by prefacing the name with a $
      - E.g., A10 is a locked reference to the cell A10, even if the formula is copied to another location

Output to Input

- Output from one scenario can be input to the next
  - Suppose you wanted to save to buy a house
    - You select the price-range of a house today
      - Use inflation formula to find out how much that might cost in, say 5 years
    - Determine how much you'll need for a downpayment
      - E.g., 10% of the inflated price of the house
    - Let that result be F in the regular savings formula
      - Find D, the regular deposit amount
    - The output of one formula is used as the input to another formula
  - Also note that if you use the same cell for `t` (time) in both formulas, it's easy to change the scenario for different time periods – change one value and both calculations remain synchronized