Introduction to Mathematical Modeling

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Homework 2 – How to build the spreadsheet.

Here are the steps we will follow in class to build our spreadsheets. We will be using spreadsheets a lot this semester so make sure you can do this on your own! Come get help if you need it.

1. 1. Rename your sheets. You will want to have at least two sheets:
    - DATA (sheet 1) – the sheet that contains parameters that you type in and/or change.
    - MODEL (sheet 2) – the sheet where you make excel do the calculations for you.
2. Enter your data and parameters in the first sheet
    - remember to label ALL of your data
    - write somewhere what your units are
    - format the data so it looks correct
3. Build your model on the second sheet
    - label column A: MONTH
    - label column B: BANKING ACCOUNT
    - enter month numbers 1- 48 in column A (use drag down feature)
    - enter your first step (month 1) equation in the first cell under the label MONEY (B2).
        - Reference the cells on the DATA sheet
        - Remember to divide by 12 when data is given in years
        - Literally make excel add things up for you
    - enter your next (month 2) equation in the second cell under the label MONEY (B3)
        - The amount of money at the last time step is now calculated in the cell above (B2) rather than on the DATA sheet
        - Reference the cells on the DATA sheet for parameters (income/expenses)
        - PUT DOLLAR SIGNS around static parameters from the DATA sheet. (ex. Change DATA!B2 to DATA!B2)
        - DO NOT put dollar signs around dynamic cells on the MODEL sheet. (ex. LEAVE cell references like B2 alone – no dollar signs)
        - use the double click on corner feature to fill in the rest of the time steps
4. You have your mathematical model – Create graphs and analyze the data.
5. Play with your numbers by changing values in the DATA spreadsheet.

Helpful Functions
In spreadsheet programs there are some very helpful functions! Here are a few:

- Basic math:
  add(+), subtract(-), multiply(*), divide(/), powers(^)
- More complicated math:
  square root (sqrt()),
  absolute value (abs())
  summing lots of numbers (sum(CELL1:CELL2))
- If statement:
  if(TEST,TRUE,FALSE)
  So if I wanted to add an extra $100 to my income only in August then I would do something like
  if(mod(A1,12)=8,100,0)
  Here the mod() function counts the months 1-12 and then starts over at 1. If we are in month 8 it will add 100 to my income otherwise it adds 0.
- Statistical functions:
  Average (average()) Standard Deviation (stdev()) Median (median())
- You can find a list of all functions under INSERT and FUNCTION LIST