Activity 1-4

February 14, 2012

Task 1: Array Functions

1. Download and save `ACT1-4_starter.xlsx`. Open it in Excel and go to the `OffsetExample2` sheet.

2. This sheet breaks `OffsetExample` from last class into multiple parts by first specifying the cells that we want to average. Change the values in each of the pink cells and observe what happens. Note two things:

   To make a function that fills a *range* of cells, you must press the "Ctrl" and "Shift" and "Enter" keys at the same time. The function will then have curly braces around it (like {`=OFFSET(B16:F16,I3-1,0)`}).

   To turn a row into a column, use the TRANSPOSE() function.

3. Fill in the orange cells to get identical results to the green and blue cells. All the correct functions are listed: this is to give you practice with using array functions.

Task 2: Matrix Multiplication

1. Go to the `MatrixMultiplication` sheet. You will find three lists: Grocery Store Prices, Bob's Grocery List, and Carol's Grocery List.

2. Fill in the first pink cell by multiplying each item by the number that Bob wants.

3. We can do the same thing using the MMULT() function. Matrix Multiplication takes the **rows** of the first matrix, multiplies each element by the **columns** of the second matrix, and returns the sum for each row/column pair. The size of the matrices is important:[1]

$$\underset{3\times4\text{ matrix}}{\begin{bmatrix} \cdot & \cdot & \cdot & \cdot \\ \cdot & \cdot & \cdot & \cdot \\ 1 & 2 & 3 & 4 \end{bmatrix}} \underset{4\times5\text{ matrix}}{\begin{bmatrix} \cdot & \cdot & \cdot & a & \cdot \\ \cdot & \cdot & \cdot & b & \cdot \\ \cdot & \cdot & \cdot & c & \cdot \\ \cdot & \cdot & \cdot & d & \cdot \end{bmatrix}} = \underset{3\times5\text{ matrix}}{\begin{bmatrix} \cdot & \cdot & \cdot & \cdot & \cdot \\ \cdot & \cdot & \cdot & \cdot & \cdot \\ \cdot & \cdot & \cdot & x_{3,4} & \cdot \end{bmatrix}}.$$

$$x_{3,4} = (1,2,3,4) \cdot (a,b,c,d) = 1 \times a + 2 \times b + 3 \times c + 4 \times d.$$

   Use the MMULT() function to find Bob's food bill.

4. Now compute Carol's food bill, first by multiplying and then using the MMULT() function. You will need to (1) use the TRANSPOSE() function and (2) treat it as a array function (see the previous task).

[1] Figures from Wikipedia.