Announcements

Project 3 will be assigned Friday
Midterm 2 will be returned in sections
Today & Thursday
Spreadsheets

Spreadsheets are a powerful abstraction for organizing data and computation
An Array of Cells

A spreadsheet is a 2 dimensional array of cells ... it’s 3D with multiple sheets

* The idea is that the rows or columns represent a common kind of data
  • They will be operated upon similarly, so that’s easy to do
  • Adding more data of the same type means adding more rows or columns
  • Often spreadsheets contain numbers, but text-only spreadsheets are useful, too
Spreadsheets are not so unusual…

- The position (row/column) names the data, as with memory locations, variables, forms…
- Operating on all elements of a column (or row) is an iteration, though not usually a WFI
- Setting a cell to a formula is an (unevaluated) assignment statement with cells as variables
- The formula is an expression
- Functions are (built-in) functions

Think of spreadsheets as a handier interface for computing ideas than JS
Familiar Terminology

<table>
<thead>
<tr>
<th>D</th>
<th>E</th>
<th>F</th>
<th>G</th>
<th>H</th>
<th>I</th>
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</thead>
<tbody>
<tr>
<td>1</td>
<td>MT</td>
<td>HW1</td>
<td>HW2</td>
<td>HW3</td>
<td>HW4</td>
<td>FINAL</td>
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</tbody>
</table>

- **row name**: row names are located at the top of each column.
- **column name**: column names are located at the left side of each row.
- **cell**: specific values are entered into cells.
- **formula**: mathematical expressions are used to calculate values.
- **referenced cell L2**: cell L2 is referenced in the formula to calculate the value in cell L2.
The data in a spreadsheet can be manipulated using formulas.

The value in H2 (selected cell) is the value in F2 times 0.621 … the result is shown, but the cell has the formula =F2*0.621.
Apply Formula Again

One way to repeat the formula is to copy-and-paste
Filling Replicates Formulas

Fill is a spreadsheet shortcut for copy-and-paste

* Grab the fill tab with the cursor and pull in the direction to be pasted

It's Magic!
Reference to cells happens in 2 ways:
Relative and Absolute (with $)

* F2 relative column, relative row
* F$2 relative column, absolute row
* $F2 absolute column, relative row
* $F$2 absolute column, absolute row

Relative references change when pasted/filled; absolute references do not change

Your intent determines which to pick
A Powerful Translation

The graphic shows the equations in the cells with the translation: The row changes going down, but the column doesn’t.
A Example

Creating a discount table is case of using both relative and absolute refs

* Consider store credit of $1 per $10 spent
* $3 store credit for every 2 CDs (1 earns $1)

<table>
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A cell is based on first column, top row data in that row and column … must mix relative and absolute references
Another handy property of fill is that it can make a series based on constants:

* Fill Sunday => Monday, Tuesday, Wed...
* Fill 22 Feb => 23 Feb, 24 Feb, 25 Feb, ...

More generally:

* Series fill will even count using a constant
* Counting by odd sizes: give 1st two items