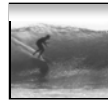




Announcements

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

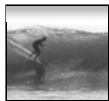
1



Spreadsheets

*Spreadsheets are a powerful
abstraction for organizing data
and computation*

© Lawrence Snyder 2006

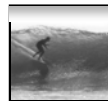


An Array of Cells

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

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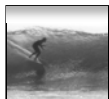
Looking for Similar Ideas

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

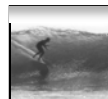
4



Familiar Terminology

row name
column name
cell
formula
referenced cell L2
column heading

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Formulas

The data in a spreadsheet can be manipulated using formulas

	B	F	G	H	I
1	Common Name	Distance (km)	Body Len (in)	Distance (Mi)	
2	Swainson's Hawk	13500	0.52	8383.5	
3	Wheatear	13500	0.16		
4	Willow Warbler	15500	0.11		
5	Short-tailed Shearwa	12500	0.43		
6	Long-tailed Skua	16000	0.51		
7	Arctic Tern	19000	0.35		

The value in H2 (selected cell) is the value in F2 times 0.621 ... the result is shown, but the cell has the formula



Apply Formula Again

One way to repeat the formula is to copy-and-paste

	B	F	G	H	I
1	Common Name	Distance (km)	Body Len (m)	Distance (Mi)	
2	Swainson's Hawk	13500	0.52	8383.5	
3	Wheatear	13500	0.16	8383.5	
4	Willow Warbler	15500	0.11	9625.5	
5	Short-tailed Shearwater	12500	0.43	7762.5	
6	Long-tailed Skua	16000	0.51	9936	
7	Arctic Tern	19000	0.35	11799	

Notice the formula



Filling Replicates Formulas

Fill is a spreadsheet shortcut for copy-and-paste

	B	F	G	H	I	J
1	Common Name	Distance (km)	Body Len (m)	Distance (Mi)	Len (m)	Distance (Mi)
2	Swainson's Hawk	13500	0.52	8383.5	0.52	8383.5
3	Wheatear	13500	0.16	8383.5	0.16	9625.5
4	Willow Warbler	15500	0.11	0.43	0.43	7762.5
5	Short-tailed Shearwater	12500	0.43	0.51	0.51	9936
6	Long-tailed Skua	16000	0.51	0.35	0.35	11799
7	Arctic Tern	19000	0.35			

fill tab

* Grab the fill tab with the cursor and pull in the direction to be pasted **It's Magic!**



Relative & Absolute Addr

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

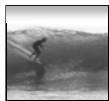


A Powerful Translation

	B	F	G	H
1	Common Name	Distance (km)	Body Len (m)	Distance (Mi)
2	Swainson's hawk	13500	0.52	=F2*0.621
3	Wheatear	13500	0.16	=E3*0.621
4	Willow warbler	15500	0.11	=E4*0.621
5	Short-tailed shearwater	12500	0.43	=E5*0.621
6	Long-tailed skua	16000	0.51	=E6*0.621
7	Arctic tern	19000	0.35	=E7*0.621

The graphic shows the equations in the cells with the translation: The row changes going down, but the column doesn't

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A Example

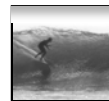
Creating a discount table is case of using both relative and absolute refs

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

	1	2	3	4	5	6	7	8
\$10.00	\$2.00	\$4.00	\$5.00	\$7.00	\$8.00	\$10.00	\$11.00	\$13.00
\$20.00	\$3.00	\$5.00	\$6.00	\$8.00	\$9.00	\$11.00	\$12.00	\$14.00
\$30.00	\$4.00	\$6.00	\$7.00	\$9.00	\$10.00	\$12.00	\$13.00	\$15.00
\$40.00	\$5.00	\$7.00	\$8.00	\$10.00	\$11.00	\$13.00	\$14.00	\$16.00
\$50.00	\$6.00	\$8.00	\$9.00	\$11.00	\$12.00	\$14.00	\$15.00	\$17.00
\$60.00	\$7.00	\$9.00	\$10.00	\$12.00	\$13.00	\$15.00	\$16.00	\$18.00

A cell is based on first column, top row data in that row and column ... must mix relative and absolute references

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Series

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

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