COMPSCI 105: Lecture #12 Spreadsheet Functions

Functions…

- have a unique name,
- have an argument list (also called a parameter list), surrounded by parentheses, which may be empty,
- return one single value,
- may be used in any formula wherever values of the function's return-type are appropriate.

Function Categories

- Mathematical (ABS, SQRT, SIN, COS, LOG, etc.)
- Statistical (SUM, AVERAGE, STDEV, MAX, etc.)
- Logical (AND, OR, NOT, IF, etc.)
- Financial (FV, NPV, PV, etc.)
- Date & Time (NOW, MONTH, DAY, YEAR, etc.)
- Engineering (DEC2BIN, HEX2DEC, etc.)
- Complex (IMSUM, IMPRODUCT, etc.)
- String (UPPER, LOWER, CHAR, MID, etc.)
- Lookup (VLOOKUP, MATCH, HLOOKUP, etc.)

Statistical Function arguments:

- Literal Numbers
- Expressions
  - simple calculations
  - involving results of other functions
- Cell addresses (both relative and absolute)
- Ranges

Ranges:

- Two cells specifying opposite corners of a box,
- May be either pair of corners,
- May be in either order.
- Example (three columns by ten rows):
  - **`A1:C10`** or
  - **`C10:A1`** or
  - **`A10:C1`** or
  - **`C1:A10`**

Statistical Functions <u>can</u> do Ranges

- **`SUM(A1,12,6*B7,C10:F22)`**
- **`AVERAGE(A1,12,6*B7,C10:F22)`**
- **`STDEV(A1,12,6*B7,C10:F22)`**
- **`MIN(A1,12,6*B7,C10:F22)`**
- **`MAX(A1,12,6*B7,C10:F22)`**

Some Functions can't do Ranges

- **=SQRT(A1:C10**) is illegal, but…
- **=SQRT(SUM(A1:C10))** is OK,
- **=SQRT(AVERAGE(A1:C10))** is OK,
- **=SQRT(MAX(A1:C10))** is OK.
- **SQRT** expects a single numeric argument, but **SUM**, **AVERAGE**, **MAX**, etc., reduce the range to a single value before **SQRT** is evaluated.

Don't Use **SUM** if not Needed

- **=SUM(A1)** is a stupid use of the **SUM** function (it works, though).
- **=A1** gives the same result without using a function.

Some Functions have NO Arguments (but they still have parentheses)

- **PI()** Returns best value for π that fits in the given bits (approximately 3.141592653…).
- **RANDOM()** Returns a random number ≥0, <1. The formula **=INT(RANDOM()*6)+1** simulates a six-sided die. Changes when sheet recalculated.
- **NOW()** Returns date/time from system clock. Changes when sheet recalculated.

Time and Date

- At 6:00am on March 19, 2015, the formula **=NOW()** returns 42082.25, encoding both date and time into a single number.
- The whole part (42082) is the date, as the number of days since the beginning of the 20TH Century (day #1 is January 1, 1900).
- The fraction (0.25) is the portion of the day since midnight (0.5 = noon, 0.75 is 6:00pm, 0.9999… is just before midnight of the following day.

Using Serial Date Numbers

- **=INT(NOW())** returns just the date part.
- **=INT(NOW())+30** returns a date 30 days in the future (for billing, say).
- **=INT(NOW())-30** returns a date 30 days in the past.
- **=DATE(1969,7,20)-INT(NOW())** returns the number of days since the first moon landing. (**DATE** requires exactly three arguments, year, month, and day, in that order.)

Using Serial Time Fractions

- The **TIME** function also expects exactly three arguments, hour (0…23), minute (0…59), and second (0…59), and returns a time fraction.
- Can be used to figure hourly wages:
- **=(TIME(17,0,0)–TIME(8,0,0))*24** computes the number of hours worked between 8:00am and 5:00pm.

Problems with Dates/Times

- Excel tends to format formulae containing **NOW**, **DATE**, and **TIME** functions as date and/or as time, even if it doesn't make sense. You may have to reformat results as General.
- Dates prior to 1900 cannot be represented.
- Excel treats 1900 as a leap year (it isn't), because Microsoft copied a bug from an early version of Lotus 1-2-3.
- Some versions of Excel for Mac start at 1904.