

CMPSCI 105: Lecture #10 Spreadsheet Functions

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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.

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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.)

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Statistical Function arguments:

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

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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

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Statistical Functions can 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)**

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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.

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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.

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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.

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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).

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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.)

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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.

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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.

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