Creating and Editing Excel Formulas

04/09/2020

Introduction

Despite having been set up with the business user in mind, Microsoft Excel is rather poor at handling precisely those aspects of statistics which might be most useful in the business context, namely informative displays of data.

Calculations, on the other hand, can be done quite quickly and (in most cases) accurately in Excel.

An additional use of Excel is as a generator of statistical tables: there are built-in routines to calculate percentage points or p-values for many distributions of interest in statistical modelling.

Creating and Editing Excel Formulas

- An Excel spreadsheet is simply a collection of cells that you can use to enter data.
- Each cell is given a name based on its position in the spreadsheet. The top-leftmost cell is called cell A1. It's the cell located in column A, row 1.
- When you enter a value in cell A1 (for example, the number 5), that cell's value becomes 5. If you enter the number 10 in cell B1, that cell's value becomes 10. You can use then use these values in a formula.

Entering a basic formula
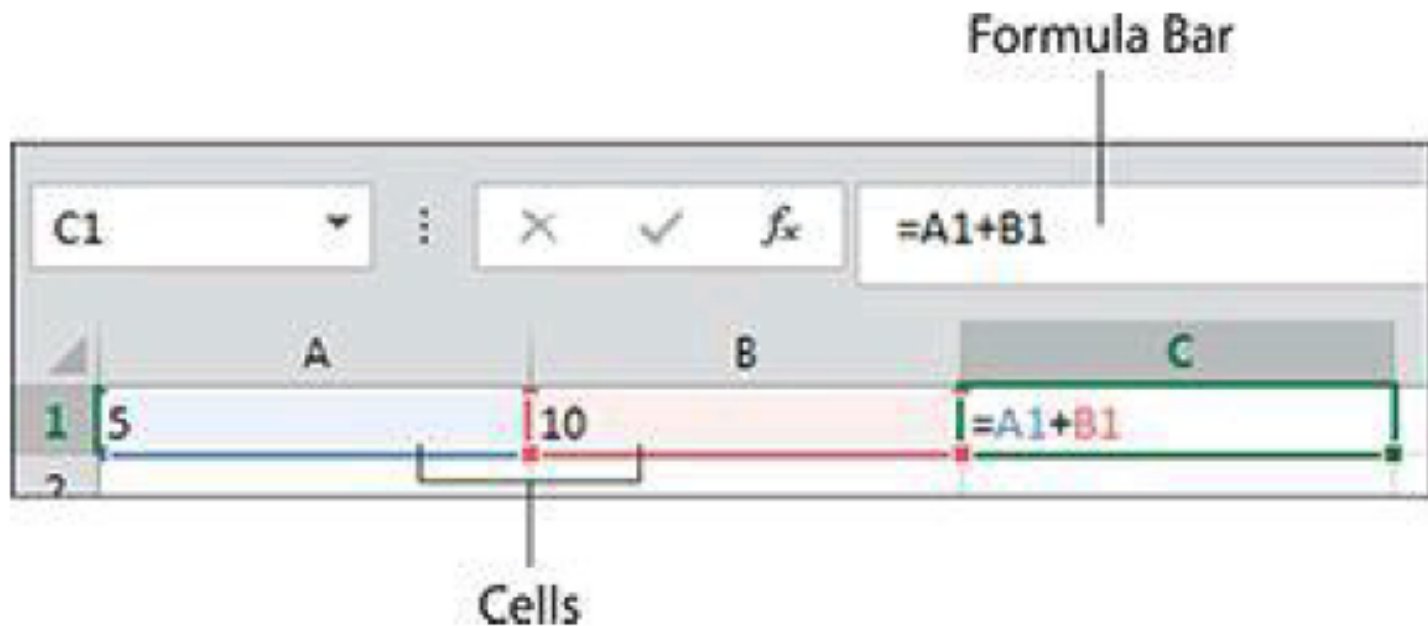
Excel formulas accept the following types of values:

- **Constants: You can use hard-coded numbers directly in a formula. For example,** you can enter **=5+10 directly into a cell to get the answer 15.**

- **Operators: These include symbols that perform addition (+), symbols that** perform multiplication (*), symbols that compare values (>), and symbols that join values together (&). For example, entering **=15>10 into a cell returns TRUE** as the result because 15 is indeed greater than 10.

- **Cell references: These include any value that points back to a single cell or** range of cells. As you've already seen, entering **=A1+B1 in a cell tells Excel to** use the values in those two cells in the formula.

- **Text strings: Any text string can be used as an argument in a formula as long as** it's wrapped in quotation marks. For example, entering **="Microsoft"&"Excel"** in any cell results in the joined text *Microsoft Excel.*

Using Formula Operators

+ The plus symbol adds two or more numeric values.

- The hyphen symbol subtracts two or more numeric values.

/ The forward slash symbol divides two or more numeric values.

* The asterisk symbol divides two or more numeric values.

% The percent symbol indicates a numeric percent. Entering a percent sign after a whole number divides the number by 100 and formats the cell as a percentage.

& The ampersand symbol is used to join or concatenate two or more textua

^ The carat symbol is used as an exponentiation operator

Using Formula Operators

= The equal symbol is used to evaluate whether one value is equal to another value

> The greater-than symbol is used to evaluate whether one value is greater than another value.

< The less-than symbol is used to evaluate whether one value is less than another value.

>= The greater-than symbol used in conjunction with the equal symbol evaluates whether one value is greater than or equal to another value.

<= The less-than symbol used in conjunction with the equal symbol evaluates whether one value is less than or equal to another value.

<> The less-than symbol used in conjunction with the greater-than symbol evaluates whether one value is not equal to another value.

Basic math

Function	Formula	Example
To add up the total	=SUM(cell range)	=SUM(B2:B9)
To add individual items	=Value1 + Value 2	=B2+C2
Subtract	=Value1 - Value 2	=B2-C2
Multiply	=Value1 * Value2	=B2*C2
Divide	=Value1 / Value2	=B2/C2
Exponents	=Value1 ^ Value2	=B2^C2
Average	=AVERAGE(cell range)	=AVERAGE(B2:B9)
Median	=MEDIAN(cell range)	=MEDIAN(B2:B9)
Max	=MAX(cell range)	=MAX(B2:B9)
Min	=MIN(cell range)	=MIN(B2:B9)

Simple formatting tricks

Function	Formula	Example
To change a cell to proper case	=PROPER(cell)	=PROPER(A2)
To change a cell to upper case	=UPPER(cell)	=UPPER(A2)
To change a cell to lower case	=LOWER(cell)	=LOWER(A2)

Conditional statements

Function	Formula	Example
If statement	=IF(logical test, "result if the test answer is true", "result if the test answer is false")	=IF(B2>69,"Pass","Fail")
Exact	=EXACT(Value1, value2)	=EXACT(B2, C2)

Absolute Cell References

- **Absolute:** When the formula is copied, the cell reference does not adjust at all.

Example: A1

- **Row Absolute:** When the formula is copied, the column part adjusts but the row part stays locked.

Example: A$1

- **Column Absolute:** When the formula is copied, the column part stays locked but the row part adjusts.

Example: $A1

Pulling things apart

Function	Formula	Example
To select a certain number of characters from the left	=LEFT(cellwithtext, number of characters to be returned)	=LEFT(A2, 6)
To select a certain number of characters from the right	=RIGHT(cellwithtext, number of characters to be returned)	=RIGHT(A2, 6)
Find text in a field	=SEARCH("text you want to find", where you want to find it)	=SEARCH(",", A2)
Extract information from the middle	=MID(cellwithtext, start position, number of characters you want returned)	=MID(A2, 9, 4)
Separate a last name (Example: Smith, Jane)	LEFT and SEARCH functions	=LEFT(A2, SEARCH(",", A2)-1)
Separate a first name (Example: Smith, Jane)	MID and SEARCH functions	=MID(A2, SEARCH(",", A2)+2, 20)

Putting things together

Function	Formula	Example
To combine cells with a space in-between	=CONCATENATE(text, " ", text)	=CONCATENATE(A2, " ", B2)
To combine cells with a space in-between (second option)	=text & " " & text	=A2 & " " & B2

Dealing with dates

Function	Formula	Example
Return the year	=YEAR(datefield)	=YEAR(A2)
Return the month	=MONTH(datefield)	=MONTH(A2)
Return the day	=DAY(datefield)	=DAY(A2)
Return the day of the week (1 = Sunday, 2 = Monday, 3 = Tuesday, etc.)	=WEEKDAY(datefield)	=WEEKDAY(A2)
To create a date from year, month, and day	=DATE(year, month, day)	=DATE(B2, C2, D2)

Understanding Formula Errors

#DIV/0!: This error value means that the formula is attempting to divide a value by zero. There is mathematically no way to divide a number by zero. You will also see this error if the formula is trying to divide a value by an empty cell.

#N/A: This error value means that the formula cannot return a legitimate result. You would typically see this error when you use an inappropriate argument in a function. You will also see this error when a lookup function does not return a match.

#NAME?: This error value means Excel doesn't recognize a name you used in a formula as a valid object. This error could be a result of a misspelled function, a misspelled sheet name, a mistyped cell reference, or some other syntax error.

#NULL!: This error value means the formula uses an intersection of two ranges that don't intersect.

Understanding Formula Errors

#NUM!: This error value means there is a problem with a number in your formula; typically an invalid argument in a math or trig function. For example, you entered a negative number where a positive number was expected.

#REF!: This error value means that your formula contains an invalid cell reference. This is typically caused by deleting a row or column to which the formula refers. This could also mean that the formula uses a cell reference that doesn't exist (A2000000, for instance).

#VALUE: This error value means that your formula uses the wrong data type for the operation it's trying to do. For example, this formula will return a #VALUE error (=100+"dog").