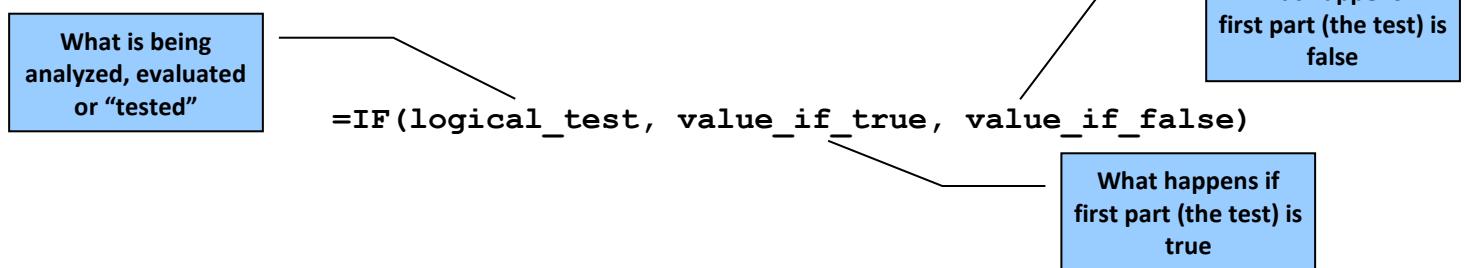


Data Analysis with the IF Function

For Microsoft Excel 365 & Earlier Versions

The Basics (Getting Started)

In Excel, the IF() function performs a calculation or other entry only if a specific condition is true, and to perform a different calculation or entry if that condition is false. The cell or entry that is evaluated may be a formula, value, or text; the displayed result may also be a formula, value, or text answer. For example, *if amount is more than 5% over budgeted amount, then display "OVER", otherwise show "OK."* The structure or syntax for the IF() function is:



- *Logical_test* is any value or expression resulting in TRUE or FALSE.
- *Value_if_true* is the value (or formula result) that will be returned if *logical_test* is TRUE.
- *Value_if_false* is the value (or formula result) that will be returned if *logical_test* is FALSE.

The result values can display text with an argument such as "OK", calculate a formula such as B12*5, or display the contents of a cell. Text results must be entered into an IF() function as a character string, that is, in double quotations. Spaces after the commas in the IF() function are optional.

Examples:

Simple IF() function formulas *	Explanation
=IF(B2>100, B2*1.25, B2)	If the value in cell B2 is greater than 100, multiply that value by 1.25, otherwise just display the value in B2 in the cell where the formula is entered.
=IF(C34>=B34, C34, "Entry not valid")	If the value in cell C34 is greater than or equal to the value in cell B34, display the value in C34, otherwise display the text "Entry not valid".
=IF(D10<2500, "No", "Yes")	If the value in cell D10 is less than 2500, display "No", otherwise display "Yes".

* As with all other Excel functions, IF() functions can be copied and the logic will copy as well.

Multiple Conditions (More Advanced)

Checking Complex Conditions

Use the AND(), OR(), and NOT() functions with the IF() function to make complex decisions.

AND Checks If More Than One Condition is True

The general structure of AND() function used with IF() function is as follows:

```
=IF(AND(expression1, expression2), value_if_true,  
value_if_false)
```

There can be up to 30 expressions as arguments to the AND() function, and *all* must evaluate true for the AND() function to evaluate true.

OR Checks If One Condition is True

The AND() function requires that *all* expressions are true. The syntax of the OR() function is identical and there can be up to 30 expressions as arguments to the OR() function, but only *one* of the expressions must be true for the OR() function to evaluate true.

The general structure of OR() function used with IF() function is as follows:

```
=IF(OR(expression1, expression2), value_if_true,  
value_if_false).
```

NOT Returns Opposite Condition

The NOT() function reverses the result of the logical argument from true to false or from false to true. Use this function to return the opposite condition of the *logical_test* in an IF() statement.

Examples:

Complex IF() function formulas	Explanation
=IF(AND(B12>5, B12<20), "Good", "Invalid")	If the contents of cell B12 is more than 5 and less than 20, the text "Good" displays, otherwise the text "Invalid" appears.
=IF(OR(C5="ABC", C5="DEF", C5="GHI"), "Correct entry", "Wrong entry")	If cell C5 contains "ABC", "DEF", or "GHI" (in upper or lower case), display "Correct entry" in the formula cell, otherwise display "Wrong entry".
=IF(OR(B36=12, B36=20), "Is a 12 or 20", "Not a 12 or 20")	If B36 contains either 12 or 20, displays the text "Is a 12 or 20", otherwise displays "Not a 12 or 20".
=IF(NOT(OR(B36=12, B36=20)), "Not a 12 or 20", "Is a 12 or 20")	If B36 contains neither 12 or 20, displays the text "Not a 12 or 20", otherwise displays "Is a 12 or 20".

Helpful Functions with IF

In addition to OR, AND, NOT, these functions are valuable options to evaluate the *logical_test*.

ISERROR (value)

Tests if the value is an error

ISNA (value)

Tests if the value is an error, specifically #N/A

ISBLANK (value)

Tests if the value is blank

ISNONTEXT (value)

Tests if the value is not text

ISNUMBER (value)

Tests if the value is a number

Nested Functions

When a function's argument is another function, it is called a *nested* function. With Excel, you can nest up to 64 levels of functions in a formula! Although many of Excel's functions can be nested, this is a common practice with the IF() function. Use of the AND(), OR(), and NOT() functions within the IF() function are examples of nested functions; additional samples are given below. One of these examples includes how to handle an IF() function with multiple *logical_test* and multiple *value_if_true* arguments.

Examples:

Nested function formulas	Explanation
=IF(ISBLANK(G4), "Data Missing", G4*J4)	If the entry in cell G4 is blank, display "Data Missing". Otherwise calculate G4*J4.
=IF(D4>DATEVALUE("1/1/22"), "OK", "Enter date after 1/1/22")	If the date entry in cell D4 is greater than 1/1/22, enter OK in cell, otherwise the phrase "Enter date after 1/1/22" appears.
=IF(AND(ISTEXT(B5), ISBLANK(C5)), "Must enter last name", "")	This IF() function combines with the Excel functions ISTEXT() and ISBLANK(). In this example, if there is text in cell B5 (such as a first name), and cell C5 is blank, then the formula cell will display the text "Must enter last name", otherwise the formula cell will display nothing.
=IF(AND(A1>=0, B1>=0), A1+B1, IF(AND(A1<0, B1<0), -A1-B1, "Both Negative and Positive values entered"))	This complex IF() function has multiple <i>logical_test</i> arguments and multiple <i>value_if_true</i> arguments. The <i>value_if_false</i> argument is only added at the end of the entire expression.



When troubleshooting a nested function or other IF() function that is not working, count the number of open and close parentheses () to make sure that every function has a matching set of parentheses. Excel also adds color to each parenthesis to make it easier to match up the sets of parentheses. Also, count the number of open and close quotations " " to ensure that every text entry (character string) has a matching set of quotations.