



Microsoft Excel – Formulas

Logical Functions

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IF Function

- The Excel **IF** function tests a supplied condition and returns one result if the condition evaluates to TRUE, and another result if the condition evaluates to FALSE.

```
=IF( logical_test, value_if_true, value_if_false)
```

where the arguments are as follows:

- logical_test - The condition that is to be tested and evaluated as either TRUE or FALSE.
- value_if_true - The result that is to be returned if the logical_test is TRUE.
- value_if_false - The result that is to be returned if the logical_test is FALSE.

IF Function

- Example of the function IF:

A	B	C
	FUNCTION	RESULT
5	IF(A2<5,"TRUE","FALSE")	FALSE
	IF(A2>5,"TRUE","FALSE")	FALSE
	IF(A2=5,"TRUE","FALSE")	TRUE
	IF(A2<5,20,10)	10
	IF(A2>=5,20,10)	20
	IF(A2<=5,"A","B")	A
	IF(A2>5,"A","B")	B

- If you get an error from the Excel IF Function, it is because the supplied logical_test argument cannot be evaluated as TRUE or FALSE.

E.g. =IF(A5=Hello,1,0) instead of =IF(A5="Hello",1,0)

Logical Functions

- The Excel **AND** function tests a number of supplied conditions and returns:
 - TRUE if ALL of the conditions evaluate to TRUE
 - FALSE otherwise (i.e. if ANY of the conditions evaluate to FALSE).

=AND(logical_test1, [logical_test2], ...)

Formulas:

	A	B	C
1	5	10	=AND(A1>0, A1<B1)
2	5	10	=AND(A2>0, A2<B2, B2>12)
3	5	10	=AND(A3<0, A3>B3, B3>12)

Results:

	A	B	C
1	5	10	TRUE
2	5	10	FALSE
3	5	10	FALSE

- The **OR** function tests a number of supplied conditions and returns either: TRUE if ANY of the conditions evaluate to TRUE or FALSE otherwise

=OR(logical_test1, [logical_test2], ...)

Nested Functions

- A **nested function** uses a function as one of the arguments in a formula.

Examples of nested function:

- =IF(AND(B2>50,B2<100),1,0)
- =SUM(AVERAGE(E2:E6), AVERAGE(F2:F6), AVERAGE(G2:G6))
- =IF(D2>89,"A",IF(D2>79,"B",IF(D2>69,"C",IF(D2>59,"D","F"))))

Note that:

- *Valid returns* - When a nested function is used as an argument, the nested function must return the same type of value that the argument uses. For example, if the argument returns a TRUE or FALSE value, the nested function must return a TRUE or FALSE value. If the function doesn't, Excel displays a #VALUE! error value.
- *Nesting level limits* - A formula can contain up to seven levels of nested functions.