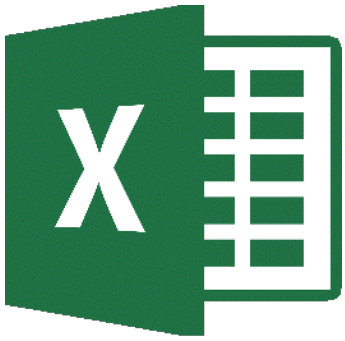
UFHealth
INFORMATION TECHNOLOGY TRAINING

Office

Excel Math: Logic and IF( ) Statements



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Excel Math: Logic and IF( ) Statements
1.0-hr Zoom / 1.5-hr Classroom

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Updated: 02/13/2025

IF Function

The IF function is one of the most popular functions in Excel, and it allows you to make logical comparisons between a value and what you expect.

An IF statement can have two results. The first result is if your comparison is True, the second if your comparison is False.

For example, =IF(C2="Yes", 1, 2) says IF(C2 = Yes, then return a 1, otherwise return a 2).

Syntax: IF(logical_test, value_if_true, [value_if_false])

Argument name	Description
logical_test (required)	The condition you want to test.
value_if_true (required)	The value that you want returned if the result of logical_test is TRUE.
value_if_false (optional)	The value that you want returned if the result of logical_test is FALSE.

Note: If you are going to use text in formulas, you need to wrap the text in quotes (e.g. "Text"). The only exception to that is using TRUE or FALSE, which Excel automatically understands.

This section is modified from the Excel Help file

Logic Qualifiers (symbols)

	A	B
1	10	10
2	15	

Description	Symbol	Example	Testing	Result
Equal	=	=A1=A2	10=10?	TRUE
		=A1=B1	10=15?	FALSE
Greater Than	>	=A1>A2	10>10?	FALSE
		=A1>B1	10>15?	FALSE
Greater Than or Equal to	>=	=A1>=A2	10>=10?	TRUE
		=A1>=B1	10>=15?	FALSE
Less Than	<	=A1<A2	10<10?	FALSE
		=A1<B1	10<15?	TRUE
Less Than or Equal to	<=	=A1<=A2	10<=10?	TRUE
		=A1<=B1	10<=15?	TRUE
Not Equal To	<>	=A1<>A2	10<>10?	FALSE
		=A1<>B1	10<>15?	TRUE

Other Logic Functions

AND

Returns TRUE if all its arguments are TRUE

Syntax: AND(logical1, logical2, ...)

Logical1, logical2, ... are 1 to 30 conditions you want to test that can be either TRUE or FALSE. The arguments must evaluate to logical values such as TRUE or FALSE. If the specified range contains no logical values, returns the #VALUE! error value.

=AND(TRUE, TRUE)	TRUE
=AND(TRUE, FALSE)	FALSE

=AND(FALSE, FALSE)	FALSE
=AND(2+2=4, 2+3=5)	TRUE

OR

Returns TRUE if any argument is TRUE

Syntax: OR(logical1, logical2, ...)

Logical1, logical2, ... are 1 to 30 conditions you want to test that can be either TRUE or FALSE. The arguments must evaluate to logical values such as TRUE or FALSE. If the specified range contains no logical values, returns the #VALUE! error value.

=OR(TRUE, TRUE)	TRUE
=OR(TRUE, FALSE)	TRUE

=OR(FALSE, FALSE)	FALSE
=OR(1+1=1, 2+2=5)	FALSE

NOT

Reverses the value of its argument. Syntax: NOT(logical) *Logical* is a value or expression that can be evaluated to TRUE or FALSE. If logical is FALSE, NOT returns TRUE; if logical is TRUE, NOT returns FALSE.

=NOT(FALSE)	TRUE

=NOT(1+1=2)	FALSE

Use nested functions in a formula

Using a function as one of the arguments in a formula that using a function is called nesting.

For example, by nesting the AVERAGE and SUM function in the arguments of the IF function, the following formula sums a set of numbers (G2:G5) only if the average of another set of numbers (F2:F5) is greater than 50. Otherwise, it returns 0.

=IF(AVERAGE(F2:F5) > 50, SUM(G2:G5), 0)

Note: You can nest up to 64 levels of functions in a formula.

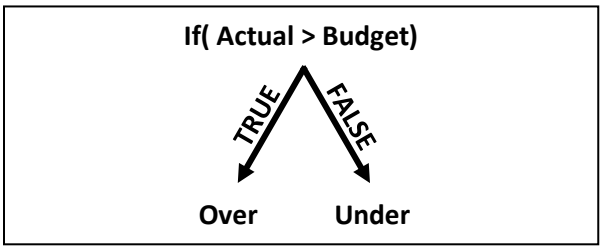
This page is modified from the Excel Help file

Class Exercise

Over Budget

If the Budgeted amount is less than the Actual amount, we are UNDER budget.
If the Actual amount is greater than the Budgeted amount, we are OVER budget.

	A	B	C	D	E	F	G	H
1	**Items**	**Budget**	**Actual**	**Over/Under**				
2	AAA	$ 123	$ 117					
3	BB	$ 456	$ 471					
4	C	$ 789	$ 749					
5	D	$ 951	$ 1,017					
6	E	$ 159	$ 164					

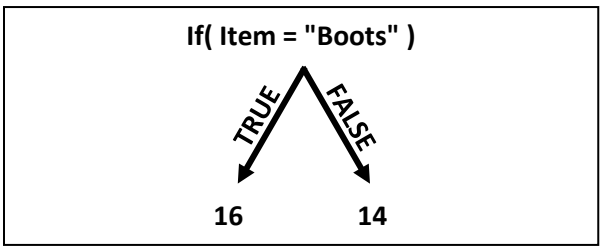


=IF(C2>B2, "Over" , "Under")

Pay Rate

The cost of repairs is different if the item is a pair of boots.

	A	B	C	D	E	F	G	H
1	**Shoes**	**Hours**	**Rate**	**Total**		**Item**	**Hourly Rate**	
2	Boots	3				Shoes	$14	
3	Flip Flop	3				Boots	$16	
4	Sandle	1						
5	Sandle	3						
6	Boots	1						
7	Boots	2						
8	Boots	3						
9	Sandle	3						
10	Flip Flop	3						
11	Sneaker	2						



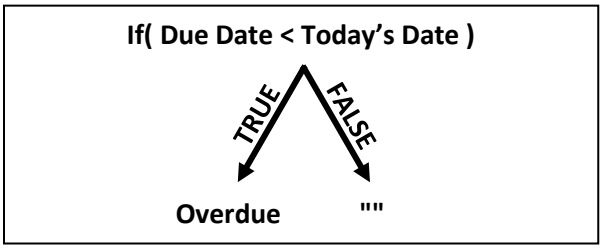
=IF(A2="Boots", 16, 14)

*Total = Hours * Rate……..=B2*C2*

Overdue

If the due date is before today, then the bill is OVERDUE.
If the due date is equal to or after today, we will leave the cell blank.

	A	B	C	D	E	F	G	H
1	**Last Name**	**First Name**	**Balance**	**Due Date**	**Overdue**		**Today's Date**	
2	Adams	Annie	$ 236.00	1/25/2021			2/25/2021	
3	Appleton	April	$ 478.00	10/9/2021				
4	Arlington	Arnold	$ 467.00	9/9/2022				
5	Brown	Bobbie	$ 128.00	11/19/2021				
6	Bruce	Butch	$ 17.00	3/9/2021				
7	Cappers	Cathy	$ 156.00	8/30/2021				
8	Carlson	Carly	$ 106.00	4/19/2020				
9	Clark	Carl	$ 392.00	8/30/2020				
10	Dawson	Debbie	$ 432.00	5/9/2022				
11								
12								
13								



=IF(D2<G2, "Overdue", "")

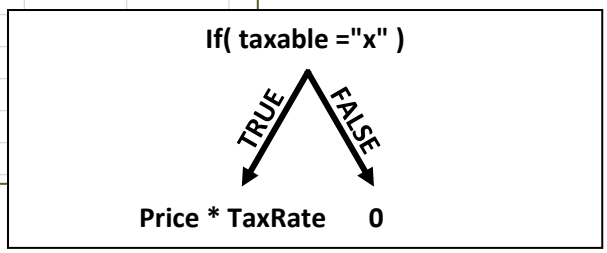
Notes:

- We use "" to represent a blank
- We had to use the $ to make the cell reference G2 Absolute (Forced)
- "Today" is an ever-moving target, changing each day. In the worksheet, I used the function =Today() in cell G2 so this formula will update each day
- Excel tracks dates sequentially, so if I wanted to find all the ones more than 90 days past due, I would use Today()-90
- I recommend creating a cell with the target dates in them. If you really want a specific date in an equation, you'll need to convert it with the DateValue() function.
  Example: =DATEVALUE("2/25/2021")

Taxable

If an item is taxable, we need the price times the tax rate.
If an item is not taxable, we can put in a zero.

	A	B	C	D	E	F	G
1	**Item**	**Price**	**Taxable**	**Taxes**	**Price w/tax**		**Sales Tax Rate**
2	$5 Sushi Wednesday	$ 5.00	x				7.00%
3	Banana	$ 0.50					
4	Black Cherry Soda	$ 0.99	x				
5	Krusteaz GF Crnbrd	$ 3.99	x				
6	Navel Orange	$ 0.82					
7	Parm/Romano	$ 1.35					
8	Whole Portabello	$ 2.00					
9	FF Seafood	$ 0.68	x				



=IF(C2="x", B2*G2, 0)

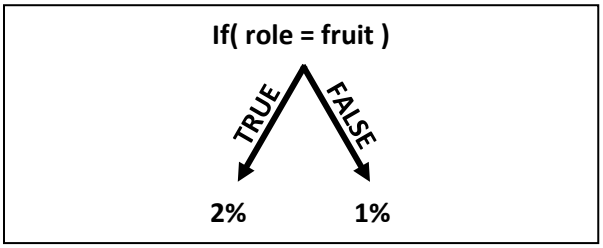
Note:

- We have to use zero instead of "" because we are using the result in another calculation.

Price Raise

If the item is a fruit it will get a 2% price raise.
If the item is not a fruit it will get a 1% Price raise.

	A	B	C	D	E	F	G	H
1	**Name**	**Role**	**Current Price/100 lb**	**Increase Amt**	**New Price**		**Role**	**Increase**
2	Banana	Fruit	$ 61.00				Veggies	1.00%
3	Cabbage	Veggie	$ 200.00				Fruits	2.00%
4	Oranges	Fruit	$ 156.00					
5	Strawberries	Fruit	$ 308.00					
6	Yellow Squash	Veggie	$ 349.00					
7	Zucchini	Veggie	$ 149.00					



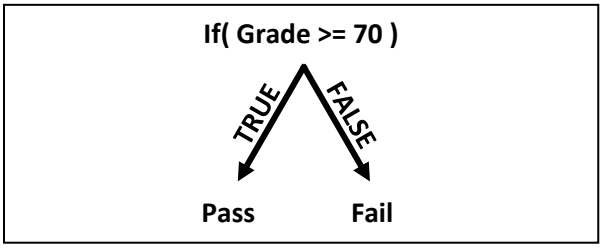
=C2 * IF(B2="Fruit", G3, G2)

New Price = Current Price + Increase Amt …… =C2+D2

Pass/Fail

If the grade is greater than or equal to 70, they Passed.
If the grade is less than 70, they failed.

	A	B	C	D	E	F	G	H
1	Grades	Pass >=70 Fail<70						
2	71							
3	90							
4	66							
5	57							
6	82							
7	81							
8	53							
9	59							

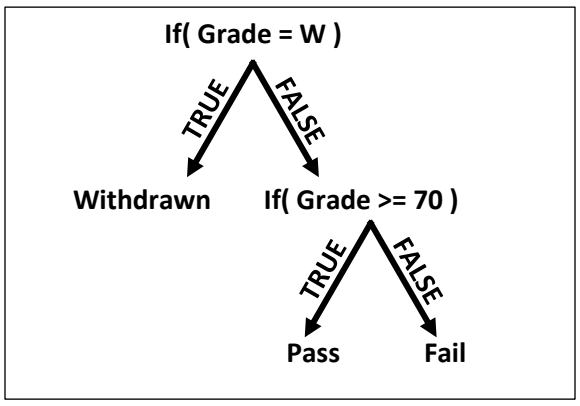


=IF(A2>=70, "Pass", "Fail")

Pass/Fail/Withdrawn

If the grade is a W mark as Withdrawn.
If the grade is not a W, test for Pass/Fail

If the grade is greater than or equal to 70, they Passed.
If the grade is less than 70, they failed.



	A	B
1	Grades	Pass >=70 Fail<70
2	71	
3	90	
4	66	
5	57	
6	82	
7	81	
8	W	
9	59	
10	94	

=IF(A2="W", "Withdrawn", IF(A2>=70, "Pass", "Fail"))

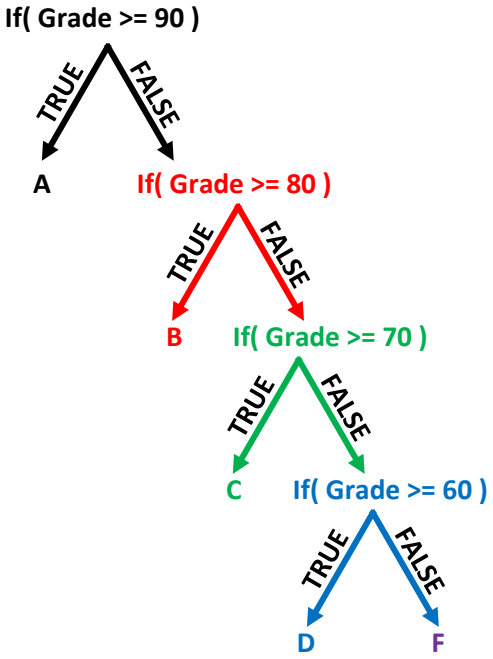
Note:

- We refer to this as a "nested if statement"

Letter Grade

If the grade is greater than or equal to 90, give an A
If the grade is greater than or equal to 80, give a B
If the grade is greater than or equal to 70, give a C
If the grade is greater than or equal to 60, give a D
If the grade is less than 60, give an F

	A	B	C	D	E	F	G	H
1	**Grades**	**Letter Grade**		**Grade**	**Letter**			
2	71			90	A			
3	90			80	B			
4	66			70	C			
5	75			60	D			
6	82			0	F			
7	81							
8	53							
9	79							
10	94							
11								
12								
13								
14								



=IF(A2>=90, "A", IF(A2>=80, "B", IF(A2>=70, "C", IF(A2>=60, "D", "F"))))

Note:

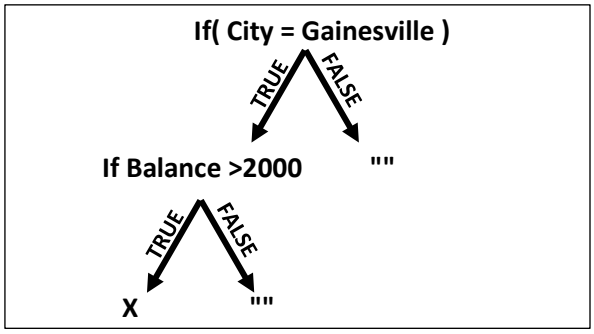
- The very last parenthesis should be black, if it is not you missed one, or have gone too far.
- I made this equation colorful to help highlight the different parts of the equation, in Excel it will look like this:

```
=IF(A2>=90,"A",IF(A2>=80,"B",IF(A2>=70,"C",IF(A2>=60,"D","F"))))
```

Mark with Nested IF
If the City is Gainesville, Check the Balance.
If the Balance is greater than 2, 000, place an X.

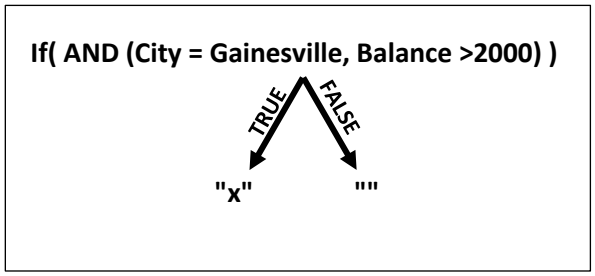
If the City is not Gainesville, leave blank.
If the Balance is not >2, 000, leave blank.

=IF(E3="Gainesville", IF(I3>2000, "x", ""), "")



Mark with AND Logic *(ALL FALSE THE SAME)*
Same as above, but since both FALSE answers are the same, we can combine the logic statements into an AND statement. See ***Other Logic Functions*** on Page 4.

=IF(AND(B3="Gainesville", F3>2000),"x","")



Mark with OR Logic *(ALL TRUE THE SAME)*
If the County is Bradford, place an X.
If the Balance is greater than 2300, place an X.

If neither is true, leave blank.

=IF(OR(E3="Bradford", F3>2300), "x", "")