tip

Eliminating divide by zero errors with the IF function

I'm often asked how it is possible to avoid the unsightly divide by zero errors in worksheets:

#DIV/0!

The IF function provides an easy solution. By testing the divisor for a zero value, the error can be eliminated.

Here's an example:

You wish to divide A1 by B1 but the formula:

=A1/B1

... gives divide by zero errors when B1=0.

Replace the formula with:

=IF(B1=0,0,A1/B1)

This time no attempt is made to divide by zero when B1=0 eliminating divide by zero errors.

You could also use the IF function to provide a custom error message like this:

=IF(B1=0,"Divide by Zero Error",A1/B1)

This technique is very useful when you only want to test for a divide by zero error.

Later in this session (in *Lesson 3-23: Use an IFERROR function to suppress error messages)* you'll learn a different technique to suppress all types of error messages, including divide by zero errors.

Lesson 3-5: Use the IF logic function

The IF function is one of Excel's most widely used and useful functions. It is also a function that often confuses my students, so I'll begin this lesson by explaining the concept of the logical test. Later, you'll construct a worksheet containing three examples of the IF function at work.

The IF function requires a *logical test* and then performs one action if the test returns TRUE and a different action if the test returns FALSE.

Here are some examples of logical tests:

Expression	Returns	Why?
6=2	False	Because six does not equal two.
100<90	False	Because 100 is not less than 90.
6+2 = 4+4	True	Because eight does equal eight.

In this lesson, you'll use three different logical tests in order to calculate several employees' earnings during a week.

1 Open *Earnings Summary-1* from your sample files folder.

Notice the *Payroll Rules* section:

	A	B	C	D	E	F
3	**Payroll Rules:**					
4	*All hours up to 35 hours per week paid at hourly rate*					
5	*All hours over 35 hours per week paid at time and a half (150% of hourly rate)*					
6	*Bonus of 5% paid on all sales above target*					

Logical tests will be constructed to calculate *Standard Pay*, *Overtime Pay* and *Bonus*:

	A	B	C	D	E	F	G	H	I
8	Name	Sales	Target	Hourly Rate	Hours Worked	Standard Pay	Overtime Pay	Bonus	Total
9	Brad Cruise	22,000	10,000	15.00	40				

In the case of *Standard Pay*, the logical test will be:

"Did this employee work more than 35 hours this week?"

The formula for the logical test is: **E9<=35** (Cell E9 is less than or equal to 35).

If this returns **TRUE,** then standard pay will be:

Hours Worked * Hourly Rate, (E9*D9)

…because the employee worked for 35 hours or less**.**

If this returns **FALSE,** then standard pay will be:

35*Hourly Rate (35*D9)

… because the employee worked more than 35 hours.

Earnings Summary-1

tip

Avoid nesting IF functions

My students often bring their own workbooks to my courses in order to find a solution to their real-world problems.

Some hideously complex and completely unfathomable workbooks turn up at my courses!

A common theme to many of these difficult-to-use workbooks is the use of nested IF functions.

Here's an example of a two-level nested IF function:

=IF(A31="Apples",10%,IF(A31="Lemons",20%,0))

This would return 10% if the value in A31 was *Apples*, 20% if the value was *Lemons* and zero if the value was anything else. Note that the words *Apples* and *Lemons* are enclosed in quotation marks. You must refer to text in this way within Excel formulas.

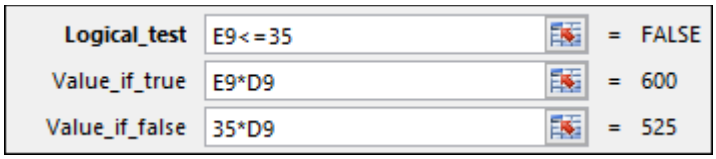
Whenever I see nested IF functions, I know that there's almost surely a better, less complex, and more understandable solution. In the above example, a VLOOKUP would provide a better solution (VLOOKUP functions will be covered in: *Lesson 3-22: Use a VLOOKUP function for an exact lookup*).

Excel 2013 allows you to nest IF functions up to 64 levels deep (which is 63 too many).

2 Use an IF function to calculate standard pay.

1. Click in cell F9.
2. Click: Formulas→Logical→IF.

   The *Function Arguments* dialog appears.
3. Complete the dialog as follows:

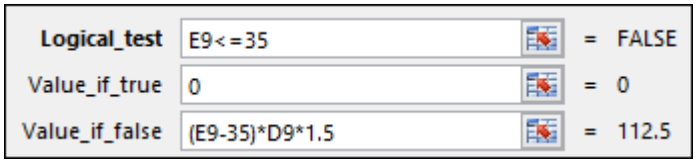


   If you do not completely understand why the above formulas are used, read the introduction to this lesson again.
4. Click the OK button.

   Standard Pay is correctly displayed in cell F9 (525.00).

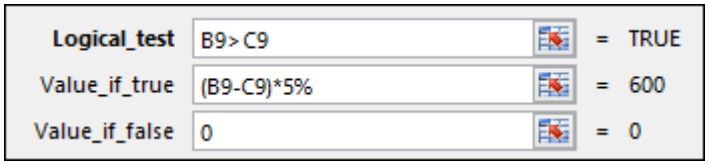
3 Use an IF function to calculate overtime pay.

It should now be clear to you why the correct arguments for the IF function, this time, are:



4 Use the IF function to calculate bonus.

Once again, it should be clear to you why the correct arguments for the IF function this time are:



5 Add a formula to cell I9 to calculate total pay.

The correct formula could be either of the following:

=F9+G9+H9
=SUM(F9:H9)

6 AutoFill the formulas in cells F9:I9 to cells F10:I17.

The payroll worksheet is now complete.

	A	B	C	D	E	F	G	H	I
8	Name	Sales	Target	Hourly Rate	Hours Worked	Standard Pay	Overtime Pay	Bonus	Total
9	Brad Cruise	22,000	10,000	15.00	40	525.00	112.50	600.00	1,237.50
10	Ian Dean	9,000	8,000	13.00	35	455.00	-	50.00	505.00
11	Paris Smith	10,000	12,000	15.00	42	525.00	157.50	-	682.50

7 Save your work as *Earnings Summary-2*.