**Excel Tips #3: It's Only Logical** (altavia.com, 2016)

It is only logical to use logic in your Excel spreadsheets. In this installment we discuss the basic logical function IF. Our next article will discuss using the functions AND and OR to build more complex logical queries.

**IF Function**

The IF function is the basis for most logic used in Excel. The syntax for the IF function is:

IF(logical_test, value_if_true, value_if_false)

logical_test → Condition to be tested

value_if_true → Value returned if the result of logical_test is TRUE

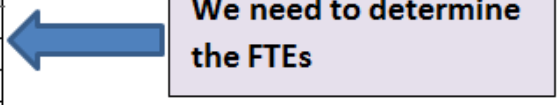
value_if_false → Value returned if the result of logical_test is FALSE

The IF function tests a condition, the logical_test, which can be a formula or a cell reference, and if the condition tests TRUE, then the IF function returns the value_if_true, otherwise it returns the value_if_false. Let's look at this in action using an example.

Assume a table of employee names with a column designating Full Time (FT) or Part Time (PT). We want a numeric count of Full Time Equivalents, or FTEs, which uses a 1.0 for a Full Time employee and something less for a Part Time employee, say 0.5 for an employee who works 20 hours a week. This is our starting point:

### Table 1

| | A | B | C |
|---|---|---|---|
| 1 | NAME | Full Time or Part Time | Number FTEs |
| 2 | Employee Name - 1 | FT | ??? |
| 3 | Employee Name - 2 | PT | ??? |
| 4 | Employee Name - 3 | FT | ??? |
| 5 | Employee Name - 4 | FT | ??? |




We can use the IF function by testing if the value in column B is "FT", and if so assign a 1.0, otherwise assign a 0.5. If there are values in column B other than FT and PT, then you need a slightly different approach (see below). This is what it looks like:

### Table 1 Revised [showing formula and result]

| | A | B | C | D |
|---|---|---|---|---|
| 1 | NAME | Full Time or Part Time | FTE Formula | FTE Result |
| 2 | Employee Name - 1 | FT | =IF(B2="FT",1,0.5) | 1 |
| 3 | Employee Name - 2 | PT | =IF(B3="FT",1,0.5) | 0.5 |
| 4 | Employee Name - 3 | FT | =IF(B4="FT",1,0.5) | 1 |
| 5 | Employee Name - 4 | FT | =IF(B5="FT",1,0.5) | 1 |

The formula in cell C2 in Table 1 [=IF(B2="FT",1,0.5)] says:

IF the value in B2 is equal to "FT" (you need the quotes), then the test is TRUE and the IF function assigns a value if 1. Otherwise, if the test is FALSE, it assigns a value of 0.5.

**Nesting IF Functions**

This works well if only FT and PT appear in column B. But what if you have three possible values, FT, PT and FS, for Full-Time Seasonal? Full-Time Seasonal works Full Time for 3 months for an FTE of .25.

One approach is nesting IF functions. It looks like this:

### Table 2 [nested IF functions]

| | A | B | C | D |
|---|---|---|---|---|
| 1 | **Name** | **Full Time or Part Time** | **FTE Formula** | **FTE Result** |
| 2 | Employee Name - 1 | FT | =IF(B2="FT",1,IF(B2="FS",0.25,0.5)) | 1 |
| 3 | Employee Name - 2 | PT | =IF(B3="FT",1,IF(B3="FS",0.25,0.5)) | 0.5 |
| 4 | Employee Name - 3 | FT | =IF(B4="FT",1,IF(B4="FS",0.25,0.5)) | 1 |
| 5 | Employee Name - 4 | FS | =IF(B5="FT",1,IF(B5="FS",0.25,0.5)) | 0.25 |

The formula in cell C2 in Table 2 [=IF(B2="FT",1,IF(B2="FS",0.25,0.5))] says:

> IF the value in B2 is equal to "FT" (you need the quotes), then assign a value of 1. Otherwise, IF the value in B2 is equal to "FS", then assign a value of 0.25. Otherwise, if neither of the two preceding tests is TRUE, assign a value of 0.5.

Note that it usually takes multiple closing parentheses at the end of a nested IF function formula, and getting that wrong will create an error (helpful hint: the last parenthesis is always black).

Don't take the nesting IF functions approach too far (apparently there's a limit of 64 nested IF functions in Excel 2010). For one thing it's easy to make a hard to find syntax mistake. If you need to make more than 3 or 4 tests, then a VLOOKUP would be a better approach (see our second Excel Tips blog "Many to One" for a discussion of the VLOOKUP function).

Using the IF function can open a whole new world of logic in your spreadsheets. It's only logical. Formula on, dudes…