Adding Power to Excel Logical Formulas, Part I: IFS

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Eight years ago, one my earliest articles for *RCM Advisor* (this publication was then called *Billing*) was an introduction to the IF function in Excel. IF is a powerful way to add conditional logic to your spreadsheet. As a quick review, the IF function has three components, or parameters. First, IF needs a logical test that it can evaluate as true or false. For example, are the billed charges in cell C5 over $1,000, is the patient in cell N15 over age 65, or has the employee in cell L28 met the FICA limit for the year? The second parameter tells the IF function what to do if the logical test is true. The third parameter tells the IF function what to do if the logical test if false. An example of an IF statement will follow later in this article.

Nested IF Statements

The basic logic of an IF statement was very helpful, so long as you only had two conditions: true or false, A or B. If your test required A, B, or C, IF was still an option, but it required nesting IF statements. Nesting functions in an Excel formula means to put one function inside another function. In other words, if A is true, check to see if B is true. If A and B are both true, return result 1. If A is true but B is false, return 2. If A and B are both false, return 3. It is easy to see how nested IF functions could quickly become unwieldy and difficult to maintain.

Look at the sample accounts receivable data in Figure 1. Column E is an IF function that tests to see if column D is greater than $500. If Column D is greater than $500, Column

FIGURE 1

	A	B	C	D	E
1	Patient	Primary Insurance	Aging	Balance	Work Today
2	Jeff Cunningham	Medicare	0-30 Days	$ 491.18	No
3	Martha Cobb	Blue Cross	31-60 Days	$ 140.43	No
4	Carrie Holmes	AETNA	61-90 Days	$ 912.60	Yes
5	Melissa Moody	AETNA	0-30 Days	$ 479.98	No
6	Alan Floyd	Blue Cross	31-60 Days	$ 707.59	Yes
7	Mildred Mitchell	Cigna	Over 90 Days	$ 623.82	Yes
8	Erica Simpson	Blue Cross	61-90 Days	$ 538.51	Yes
9	Evelyn Montgomery	Medicare	0-30 Days	$ 368.12	No
10	Floyd Richards	United	61-90 Days	$ 221.82	No
11	Julia Dennis	United	0-30 Days	$ 217.78	No
12	Connie Hunter	Medicare	31-60 Days	$ 296.68	No
13	Theresa Harmon	United	31-60 Days	$ 961.56	Yes
14	Karen Russell	Blue Cross	Over 90 Days	$ 124.05	No
15	Miguel James	Medicare	61-90 Days	$ 649.41	Yes
16	Jorge Griffin	Cigna	Over 90 Days	$ 629.73	Yes
17	Dorothy Navarro	United	0-30 Days	$ 454.61	No
18	Derrick Schultz	AETNA	0-30 Days	$ 935.60	Yes
19	Debra Hunter	Medicare	Over 90 Days	$ 120.85	No

FIGURE 2

	A	B	C	D	E	F
1	Patient	Primary Insurance	Aging	Balance	Work Today	Nested IF Work Today
2	Jeff Cunningham	Medicare	0-30 Days	$ 491.18	No	No
3	Martha Cobb	Blue Cross	31-60 Days	$ 140.43	No	No
4	Carrie Holmes	AETNA	61-90 Days	$ 912.60	Yes	Yes
5	Melissa Moody	AETNA	0-30 Days	$ 479.98	No	No
6	Alan Floyd	Blue Cross	31-60 Days	$ 707.59	Yes	Yes
7	Mildred Mitchell	Cigna	Over 90 Days	$ 623.82	Yes	Yes
8	Erica Simpson	Blue Cross	61-90 Days	$ 538.51	Yes	Yes
9	Evelyn Montgomery	Medicare	0-30 Days	$ 368.12	No	No
10	Floyd Richards	United	61-90 Days	$ 221.82	No	No
11	Julia Dennis	United	0-30 Days	$ 217.78	No	No
12	Connie Hunter	Medicare	31-60 Days	$ 296.68	No	Yes
13	Theresa Harmon	United	31-60 Days	$ 961.56	Yes	Yes
14	Karen Russell	Blue Cross	Over 90 Days	$ 124.05	No	Yes
15	Miguel James	Medicare	61-90 Days	$ 649.41	Yes	Yes
16	Jorge Griffin	Cigna	Over 90 Days	$ 629.73	Yes	Yes
17	Dorothy Navarro	United	0-30 Days	$ 454.61	No	No
18	Derrick Schultz	AETNA	0-30 Days	$ 935.60	Yes	Yes
19	Debra Hunter	Medicare	Over 90 Days	$ 120.85	No	Yes

E is Yes, indicating to the billing staff to work that claim today. The formula in cell E2 is =IF(D2> 500, "Yes," "No"). The logical test is D2>500. If cell D2 is greater than $500, the cell returns Yes. If cell D2 is less than or equal to $500, the cell returns No.

Figure 2 has a nested IF example. This time the billing manager wants the team to work the claim if the dollar amount is over $500 or if the claim is over 90 days, but not if the claim is less than 30 days. The billing manager then added another request to work any Medicare claims because of a problem with the fiscal intermediaries' software upgrade. The nested IF functions to accomplish this request are in the formula:

=IF(D2>500,"Yes",IF(C2="Over 90 Days", "Yes", IF(C2 = "0-30 Days", "No", IF(B2="Medicare","Yes","No"))))

The billing manager's request could have been a lot more complicated. Keeping track of which statements must be true

to get the correct result can become tricky, especially if the formula needs to be edited months after it was written.

The New IFS function

To make IF statements more powerful, faster to write, and easier to maintain, Microsoft added a new IFS function. The structure of IFS is a little different. Instead of a logical condition, followed by what to do if the condition is true, followed by what to do if the condition is false, IFS is a little simpler. The syntax is =IFS(logical test 1, value if true 1, logical test 2, value if true 2), and so on. An example of IFS is in Column G of Figure 3.

The formula in cell G2 is:

=IFS(D2>500,"Yes",C2="Over 90 Days", "Yes", C2 = "0-30 Days", "No", B2="Medicare","Yes",TRUE, "No")

Notice how there is only one function, IFS, instead of the four separate IF functions in the nested IF example. As a result,

there is only one closing parentheses in the IFS example compared to the four closing parentheses in the nested IF example. Keeping track of the correct number of parentheses can be a challenge with nested formulas. IFS evaluates the conditions in order. The first time a condition evaluates to true, IFS stops testing and returns the related value if true. Given this logic, it is important to prioritize the conditions an IFS statement in the formula carefully to ensure that the function returns the results you expect.

The other important difference between nested IF functions and IFS is what to do if a condition is false. IF statements, nested or not, require what Excel calls a "value if false." In other words, what should the IF function do if the logical test is false? The IFS function is different. The IFS function is only a series of logical tests and what to do if the test is true. There are no instructions or default if the logical test is false. Look at my IFS example formula again:

=IFS(D2>500,"Yes",C2="Over 90 Days", "Yes", C2 = "0-30 Days", "No", B2="Medicare","Yes",TRUE, "No")

Notice how the very last test is TRUE. The keyword TRUE simply tells Excel to evaluate this logical test as true. If none

of the logical tests in an IFS function are true, IFS will return an #N/A error message. By making the last logical test TRUE, you can control what happens if none of the preceding tests are true. Since the IFS statement evaluates the conditions in order, always make TRUE your last condition, and then put the default value to return if all other tests are false.

The new IFS function makes complex logic easier to read and document. Microsoft released a new SWITCH function that also makes complex logic easier. Watch for more information on SWITCH in the next issue of *RCM Advisor.* Please review more function examples in the Excel Video playlists at **mooresolutionsinc.com** ■

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FIGURE 3

	A	B	C	D	E	F	G
1	Patient	Primary Insurance	Aging	Balance	Work Today	Nested IF Work Today	IFS Work Today
2	Jeff Cunningham	Medicare	0-30 Days	$ 491.18	No	No	No
3	Martha Cobb	Blue Cross	31-60 Days	$ 140.43	No	No	No
4	Carrie Holmes	AETNA	61-90 Days	$ 912.60	Yes	Yes	Yes
5	Melissa Moody	AETNA	0-30 Days	$ 479.98	No	No	No
6	Alan Floyd	Blue Cross	31-60 Days	$ 707.59	Yes	Yes	Yes
7	Mildred Mitchell	Cigna	Over 90 Days	$ 623.82	Yes	Yes	Yes
8	Erica Simpson	Blue Cross	61-90 Days	$ 538.51	Yes	Yes	Yes
9	Evelyn Montgomery	Medicare	0-30 Days	$ 368.12	No	No	No
10	Floyd Richards	United	61-90 Days	$ 221.82	No	No	No
11	Julia Dennis	United	0-30 Days	$ 217.78	No	No	No
12	Connie Hunter	Medicare	31-60 Days	$ 296.68	No	Yes	Yes
13	Theresa Harmon	United	31-60 Days	$ 961.56	Yes	Yes	Yes
14	Karen Russell	Blue Cross	Over 90 Days	$ 124.05	No	Yes	Yes
15	Miguel James	Medicare	61-90 Days	$ 649.41	Yes	Yes	Yes
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17	Dorothy Navarro	United	0-30 Days	$ 454.61	No	No	No
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