Chapter 2: Conditionals

"If we don't succeed, then we run the risk of failure."

– J. Danforth Quayle

The IF() function is the second most common function, after SUM(). Unlike previous functions, this powerful function features a three-part complement. Each element of the complement is separated from the other by a comma.

Three-Part Complement

The general form of the IF() function is:

=IF(*condition*,*true*,*false*)

where:

- *condition* is any test, or statement that the computer can judge to be either true or false.
- *true* is any valid number, string, or formula. If the *condition* is true, this value will appear.
- *false* is any valid number, string, or formula; if the *condition* is false, this value will appear.

Condition

Examples of a condition, or test, include:

- A1 = 5
- A2 = B4
- A3 = 2 * B4

In each case, the computer tests the condition and determines whether it is true or false. As you can see, we can use any arithmetic combination of cells and numbers to create a test statement.

What about this statement:

7 = 7

Is this a condition? Yes. It is a statement that the computer can judge to be true or false. The fact that it is obviously true to us is irrelevant; to the computer, A1 = 5 is just as obviously true or false as 7 = 7.

We can also use Boolean operators for comparisons in tests. There are six Boolean operators:

- > means "greater than"
- >= means "greater than or equal to"
- < means "less than"
- <= means "less than or equal to"
- = means "equal to"
- <> means "not equal to"

Comparisons return "1" if expression is True; "0" if False. The following are valid test statements:

- A4 < B4 . . . . (A4 is less than B4)
- A4 > B4 . . . . (A4 is greater than B4)
- A4 <= B4 . (A4 is less than or equal to B4)
- A4 >= B4(A4 is greater than or equal to B4)
- A4 <> B4 . . . . (A4 is not equal to B4)

We are not limited to numerical comparisons. We can also use strings in tests. To use a string in a formula, we place it inside the double quotation mark. Note that this must be Shift "; this is not the same as pressing ' twice! For example:

A4 = "Hello"

is the Test to see if cell A4 contains the text

Hello

One common test is used to see if there is anything at all in a cell. This test looks like this:

A4 = ""

A double quotation mark followed by a double quotation mark mean a string with no contents—the "null string."

True & False Arguments

Both the True and the False arguments follow the same rules. If the argument is a string, it must be enclosed in double quotes. If it is not a string—that is, if the argument is a number, a cell address, or a formula—you do ***not*** use quotation marks. Here are some examples of valid statements:

	A	B	C	D	E
1	5				
2	6				
3					
4	=IF(A1=A2,"They're equal.","They're unequal.")				

The formula in cell A4 tests to see if cell A1 contains the same value as A2. If they are—that is, if the test is true—the cell displays:

`They are equal.`

If they are not—if the test is false—the cell displays:

`They are unequal.`

Thus in this case, when you enter this formula in cell A4 and press ←Enter, cell A4 will display:

`They are unequal.`

Let's examine a Boolean Test:

	A	B	C	D	E
1	5				
2	6				
3					
4	=IF(A1>A2,A1,A2)				

The formula tests to see if cell A1 is greater than cell A2. If they are—that is, if the test is true—cell A4 displays the contents of cell A1. If they are not—that is, if the test is false—the cell displays the contents of cell A2. In this case, when you enter this formula in cell A4 and press ←Enter, cell A4 will display:

`6`

Compare this example to the previous one:

	A	B	C	D	E
1	5				
2	6				
3					
4	=IF(A1>A2,"A1","A2")				

As before, this formula tests to see if cell A1 is greater than A2. If they are—that is, if the test is true—A4 displays the string:

`A1`

because A1 is inside double quotes. If they are not—that is, if the test is false—the cell displays the string:

`A2`

In this case, when you enter this formula in A4 and press ←Enter, A4 will display:

`A2`

	A	B	C	D	E
1					
2					
3					
4	=IF(A1="","A1 contains nothing!","")				

This formula tests to see if cell A1 contains nothing. If it contains nothing, the test is true, and the cell displays:

`A1 contains nothing!`

If it contains something, the test is false, and cell A4 displays the null string—that is, it displays nothing. Thus in this case, when you enter this formula in cell A4 and press ←Enter, A4 will display:

`A1 contains nothing!`

AND & OR

You may want the Test parameter of an IF() function to consider more than one thing. Let's put this in non-computer terms. You may eat at a restaurant *IF* you are hungry and *IF* you have money. If only one of those conditions are met, you will not eat at the restaurant. Both conditions must be met. This is known as a "logical AND."

Let's try another non-computer example. I carry an umbrella when it is raining and I carry an umbrella when it is cloudy. Should I carry an umbrella now? In this case, either condition must be met. This is known as a "logical OR." When I stated the problem, I used the word "and," but this is a red herring. Grammar often gets in the way of clear thinking about the logical AND and logical OR:

- If ***all*** of the conditions must be met, use a logical AND.
- If ***only one*** of the conditions must be met, use a logical OR.

Excel has two functions that allow us to use "logical AND" and "logical OR":

- AND(*condition1,condition2,condition3,...*)
- OR(*condition1,condition2,condition3, . . .*)

Array of Constants

Consider this. If a cell A1 contains 1, 2, or 3, we want to display one thing; it doesn't, we want to display something else. This would look something like this:

=IF(OR(A1=1,A1=2,A1=3),"one thing","something else")

As you can see, even in this simple example, a nested OR() function can become fairly convoluted. To solve this problem, we can use an array of constants. We express an array of constants by placing them inside braces:

{1,2,3}

This allows us to translate the previous formula into:

=IF(OR(A1={1,2,3}),"one thing","something else")

Arrays of constants are commonly used for OR() functions to add clarity, prevent errors, and reduce the number of keystrokes. As its name implies, an array of constants cannot include cell addresses.

Logical AND Example

	A	B	C	D	E
1	2				
2	3				
3					
4	=IF(AND(A1="",A2=""),"",A1+A2)				

The formula in cell A4 tests to see if cells A1 and A2 contain nothing. Because this uses the AND function, we know that ***both*** conditions must be met; that is, cell A1 must contain nothing ***and*** cell A2 must contain nothing for the test to be true. If the test is true, cell A4 displays nothing. If either cell A1 or A2 contains something, the test is false, and cell A4 displays the value of:

A1+A2

Thus, in this case, when you enter this formula in cell A4 and press ←Enter, it will will display:

5

Note that the False parameter—A1+A2—does not begin with "="; remember that the equal sign merely announces to Excel, "what follows is a formula." Because it is already inside a formula, you don't have to announce it again.

Free Checking Example

Consider a bank that offers "free" checking if you maintain at least $750 in savings and $900 in checking or $2,000 in both. If you don't maintain these balances, each check costs 40¢.

	B	C	D	E	F
2	**Name**	**Checking**	**Savings**	**Checks**	**Fee**
3	Fred	1,999.00		20	
4	Wilma	2,000.00		10	
5	Barney	2,000.00		30	
6	Betty	749.00	900.00	5	

Figure 1

Now, we would like to write one formula in cell F3 and copy it straight down. The results will appear in Figure 2:

	B	C	D	E	F
2	**Name**	**Checking**	**Savings**	**Checks**	**Fee**
3	Fred	1,999.00		20	8.00
4	Wilma	2,000.00		10	0.00
5	Barney	2,000.00		30	10.00
6	Betty	749.00	900.00	5	0.00

Figure 2

These conditionals can be a little confusing, but it helps to sketch out the formula in plain English, without worrying about the precise syntax. Programmers call this writing pseudocode. Let's examine this process:

Step 1: Always state the situation in plain English, just to make sure you understand the problem:

"If Checking + Savings is more than 2,000 or Checking is greater than 900 and Savings is greater than 750, then the fee is 0; otherwise, the fee is number of checks time .40."

Step 2: Let's try to place our plain English statement, from the previous step, in the general form.

- Remember that the general form of an IF() statement is:

  =IF(*test*,*true*,*false*)

  =IF(Checking + Savings is more than 2000 or Checking is greater than 900 and Savings is greater than 750,0, E3*.4)

Step 3: Looking at the Test, we see that there are two conditions that could permit no fee:

- Checking + Savings is more than 2000

- Checking is greater than 900 and Savings is greater than 750

If ***either one*** (or both) of these conditions are met, then we want the test to return true, so that the fee is zero. This calls for the logical OR:

```
=IF(OR(Checking + Savings is
more than 2000, Checking is
greater than 900 and Savings
is greater than 750),0, E3*.4)
```

Step 4: Examine the complement of the OR() function. The "Checking + Savings is more than 2000" part is easy enough; it can be reduced to:

```
C3+D3>=2000
```

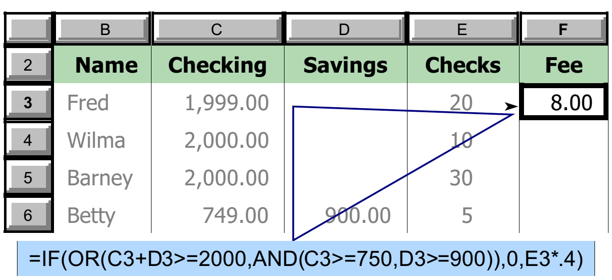
Step 5: The second condition, "Checking is greater than 900 and Savings is greater than 750" requires that ***both conditions*** be met. This calls for the logical AND():

```
AND(Checking>=900,Savings>=750)
```

Step 6: If you combine the results of the last three steps, you will get:

```
=IF(OR(C3+D3>=2000,AND(Checking>
=900,Savings>=750)),0, E3*.4)
```

which can be simplified to:



Step 7: Copy the formula in cell F3 down, through cell F6.

TOOLTIP (XP)

Introduced in Excel XP, a ToolTip pops up when you start typing a function, suggesting the function's complement.

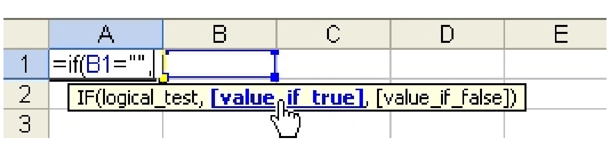


Figure 4

As you can see in Figure 4, the ToolTip becomes a hyperlink to the Help file when you pass your mouse over it.

CONDITIONAL FORMATTING

There is a managerial concept called "Management by Exception." It means that a manager should not be swamped in administrivia, but focus on those figures that, for whatever reason, are unusual.

We can extend this approach to spreadsheets by using conditional formatting. With conditional formatting, a cell will change its appearance if certain conditions are met, making it easier to spot something out of the ordinary.

Step 1: Select the cells of interest.

Step 2: From the pull-down menu, select Format, Conditional Formatting.

Step 3: For Condition 1, you may check the Cell Value or the Formula.

Step 4: In the second box, select a condition:

- between;
- not between;
- equal to;
- not equal to;
- greater than;
- less than;
- greater than or equal to; or,
- less than or equal to.

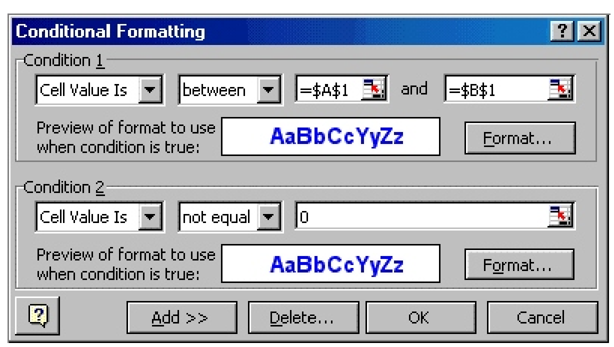


Figure 5

Step 5: Enter a value or cell address in the third box:

- If you choose "between" or "not between," a fourth box will appear, as seen in Figure 5.

Step 6: Click **Format**.

Step 7: Specify the way you want Excel to display the cell if these conditions are met.

Step 8: Click **OK** when you are finished.

Step 9: To add another condition click **Add >>** and repeat the steps for it.

- You can have up to three conditions.

Step 10: When finished, click **OK** to accept your changes and close the dialog.

ERRORS

Excel is terrific at doing the complicated, but doing the impossible is another matter. You have undoubtedly encountered numerous error messages as you have worked with formulas. For example, if you attempt to divide a cell by zero, Excel will return #DIV/0:

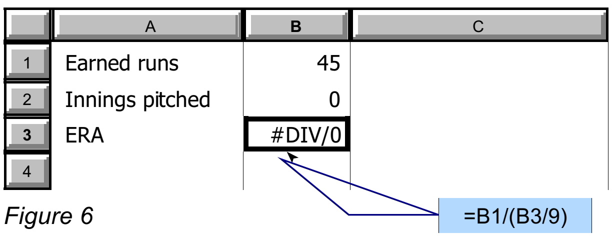


Figure 6

One way to handle error messages is to suppress them with formulas, as shown in Figure 7.

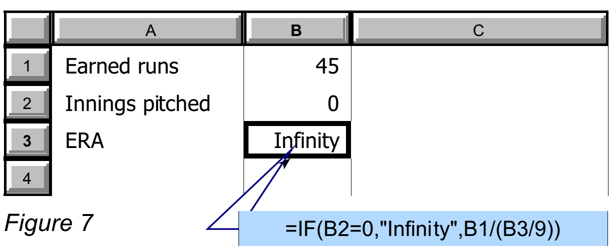


Figure 7

FORMATTING LOGIC ERRORS

It is possible to pitch zero innings and give up 45 runs—in other words, the pitcher did not retire a batter. Technically, his or her earned run average (ERA) would be infinite, and the formula in Figure 7 would reflect that.

Usually, though, division by zero indicates a logical error. We don't want to "fix" the error as before, but to display it clearly:

Step 1: Select the cell that could contain an error.

Step 2: From the pull-down menu, select Format, Conditional Formatting.

Step 3: Select "Formula Is" from the Condition 1 drop-down list.

Step 4: Type:

=ISERROR(*x*)

where *x* is the name of the cell to which the Conditional Formatting is being applied.

- In this example, the formula would be:
  =ISERROR(B3)
  as shown in Figure 8.

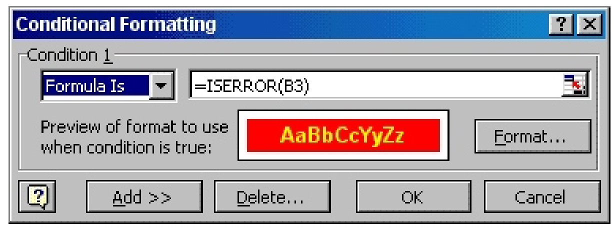


Figure 8

Step 5: Click **Format**.

Step 6: Apply a conditional formatting.

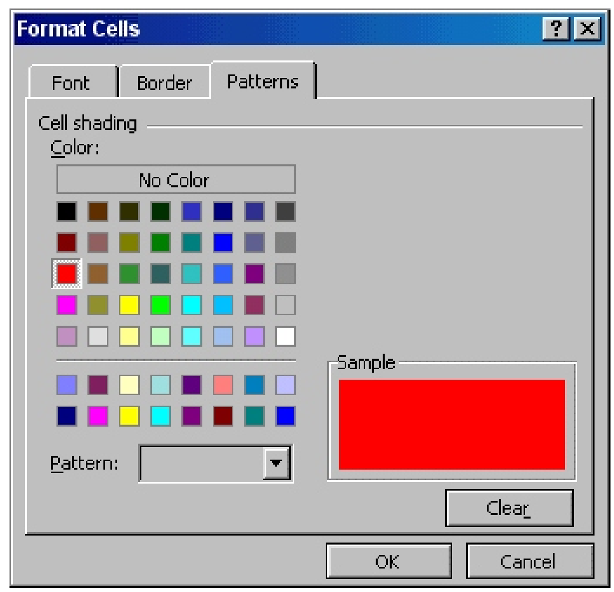


Figure 9

Step 7: Click **OK** twice to close the dialogs and apply the conditional formatting.

- The results appear in Figure 10.

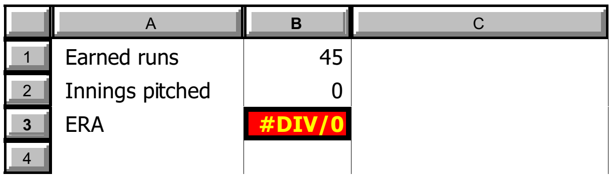


Figure 10

DATES

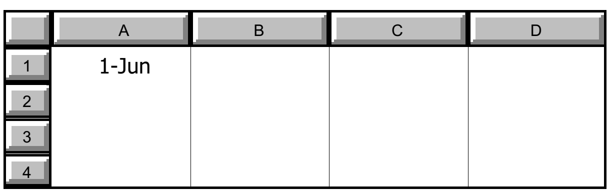
You can also use conditional formatting to identify a particular date. This approach will demonstrate the use of formulas in conditional formatting as well as the sequential nature of applying rules:

Step 1: In cell A1, type the first day of the current month.

Step 2: To format the cell, either:

- press Ctrl 1 or,
- from the pull-down menu, select Format, Cells.

Step 3: On the Number tab, select the Date Category, select an appropriate Type, and click OK.



Now apply the conditional formatting:

Step 4: With the date range selected, from the pull-down menu, select Format, Conditional Formatting.

Step 5: From the Condition 1 combo box, select Formula Is and enter:

=today() - A1

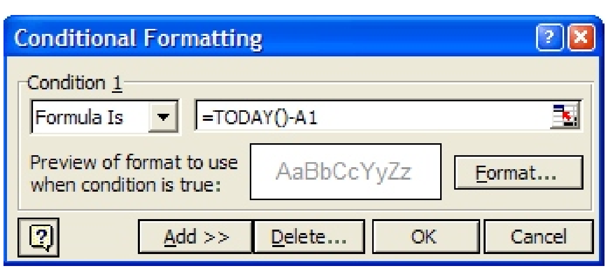


Figure 11

Step 6: Click Format.

Step 7: Select gray text and click OK

Step 8: Click Add >> and, from the Condition 2 combo box, set:

- Cell Value Is
- not equal to
- 0

as shown in Figure 12.

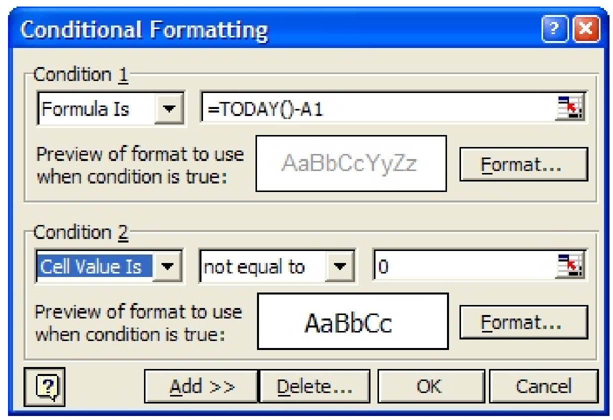


Figure 12

Step 9: Click Format.

Step 10: Select the Bold Italic Font style and red from the Color combo box, as shown in Figure 13.

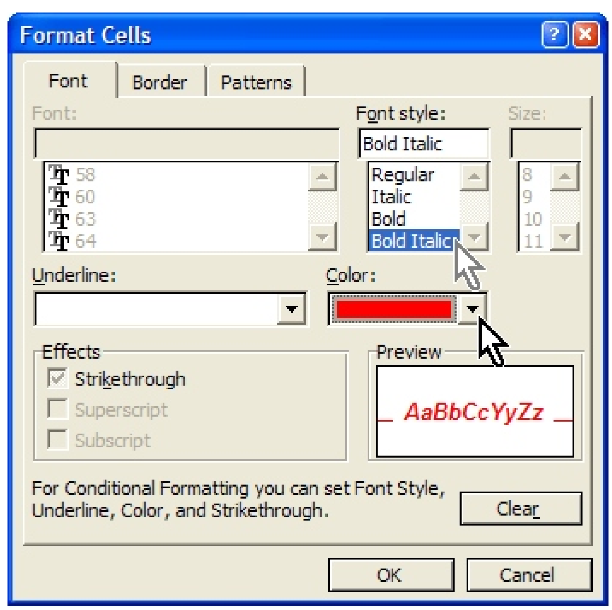


Figure 13

<u>Step 11</u>: Click **OK** to proceed.

Now, today's date should be highlighted in ***RED***, while the other dates should appear in gray.

This needs some explanation. Excel applies each condition sequentially. This means that whenever the first condition:

=TODAY() - A1

evaluates as TRUE, then Excel displays the contents of the cell in gray type, and disregards the rest of the rules. It only considers Condition 2 if the formula evaluates as FALSE.

But how can a formula be TRUE or FALSE? Excel uses numbers to represent TRUE and FALSE. FALSE is always represented by 0 (zero). Thus, only when the formula:

=TODAY()-A1

returns 0—when the target cell contains today's date—does Excel treat it as if it is returning a logical FALSE, and move on to the second condition.

Watch (2002)

Excel 2002 has a Watch Window feature that allows you to keep an eye on critical cells, wherever they appear in an open workbook. To display the Watch Window:

- from the pull-down menu, select <u>V</u>iew, <u>T</u>oolbars, <u>W</u>atch Window.
- right-click any cell and select Add Watch from the pop-up menu.

The Watch Window lists the cell, along with its workbook, worksheet, range name, value, and formula, where relevant.

To edit a cell in the Watch Window, double-click its entry and you will go to it. To delete a cell from the Watch Window, click it once to select it and click the Delete Watch option.

A single Watch Window is used for all open workbooks. Cells linked to other workbooks appear in the Watch Window when you open the corresponding workbook.

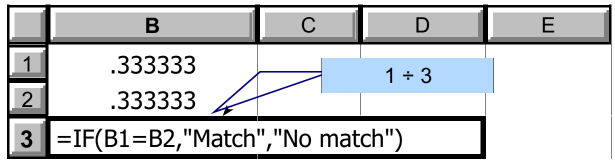
Machine Rounding

Take a calculator. Take the square root of 2, again and again. Now, square it, again and again. Do you get 2? You probably get *close* to two, but as the old saying goes, close only counts in horseshoes and hand grenades.

This anomaly is caused by machine rounding. Machine rounding occurs because every machine ultimately must round certain calculations. For example what is 1 ÷ 3, exactly? As you know, there is no "exact" answer.

<u>ROUND()</u>

Usually, these errors are insignificant. We can make them less significant by displaying more decimal places. When we encounter them in conditionals, though, we run into problems. For example, what will cell B3 return when you hit ↵Enter.



They appear to be equal. But what if cell B1 contains 1 ÷ 3 and cell B2 contains *exactly* .333333? They are not equal—but they are close. If it's close enough for our purposes, we can use the ROUND() function to help return the correct answer. We commonly use the ROUND() function when we are comparing two values and one (or both) of them were calculated through division.

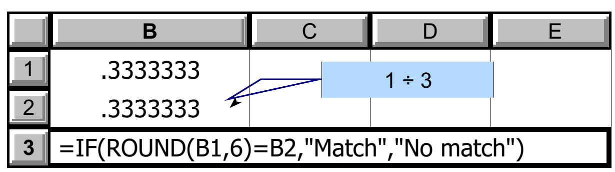
The ROUND() function appears in the general form:

Round(*Value*,*NumberOfDecimals*)

where:

- *Value* is the cell or value in question; and,
- *NumberOfDecimals* is the number of decimal points to which you want to round the number.

Thus, if for our purposes, we only care about six decimal places, then 1 ÷ 3 rounded to six decimals does indeed equal .333333. This is how we would return "Match":



Notes

Lab 2: Using Conditionals

The IF() function isn't hard to understand, but it requires a little practice before you can fully appreciate its power.

Checkbook Exercise

Step 1: Set up the worksheet as follows:

	A	B	C	D
1	Item	Deposits	Withdrawals	Balance
2	Initial	100		
3				
4				

Step 2: Cell D2 should contain a formula that reflects any deposits, as well as any withdrawals, on that line:

	A	B	C	D
1	Item	Deposits	Withdrawals	Balance
2	Initial	100		=B2+C2
3				
4				

When you press ←Enter, cell D2 will display 100. Now, we want to put a formula in cell D3 that can be copied to the subsequent rows:

Step 3: Enter:

=D2+B3-C3

in cell D3 and press ←Enter.

	A	B	C	D
1	Item	Deposits	Withdrawals	Balance
2	Initial	100		100
3	Food		20	=D2+B3-C3
4				

- Cell D3 should display 80.

Step 4: Copy the formula in cell D3 down to the next hundred rows by clicking and dragging its fill handle, in the lower right hand corner of the cell.

	A	B	C	D
1	Item	Deposits	Withdrawals	Balance
2	Initial	100		100
3	Food		20	80
4				

Step 5: Add some items, as follows:

	A	B	C	D
1	Item	Deposits	Withdrawals	Balance
2	Initial	100		100
3	Food		20	80
4	Pay	400		480
5				480
6				480

As you can see, it works fine, but cosmetically it leaves something to be desired. What we really want is for the balance to appear *if we have entered an item*. Otherwise, we want nothing at all to appear:

Step 6: Delete the contents of D3 and the cells below it.

- A fast way to do this is to move to D3, press Shift Ctrl ↓, and press Delete.

Step 7: Rewrite the formula, using the IF() function.

- This formula says, in effect, if there is nothing in cell A3, then show nothing; otherwise, show:

D2+B3-C3

	B	C	D
1	Deposits	Withdrawals	Balance
2	100		100
3		20	=IF(A3="","",D2+B3-C3)
4	400		
5			

Step 8: Copy this formula straight down, by clicking and dragging the fill handle.

- This time, the results look great:

	A	B	C	D
1	**Item**	**Deposits**	**Withdrawals**	**Balance**
2	Initial	100		100
3	Food		20	80
4	Pay	400		480
5				

Note that even though cell D5 contains a formula:

=IF(A5="","",D4+B5-C5)

nothing appears there, because there is nothing in cell A5.

MILEAGE EXAMPLE REVISITED

Back in Lab ?, we developed a spreadsheet that calculated our gas mileage. We simply entered the ending mileage and the number of gallons of gas purchased. This is where we left the project:

	D	E	F	G
2	***Gas Mileage Calculator***			
3	**Initial Mileage**	**Ending Mileage**	**Gas (in gallons)**	**MPG**
4	50,021.1	50,325.0	11.2	27.1
5	50,325.0	50,625.3	12.2	24.6
6	50,625.3			**#DIV/0!**
7	-			**#DIV/0!**

=(E4-D4)/F4

=E4

It worked, but, as you can see in cell G6, we got an error message for our attempt to divide by zero. We weren't really dividing by zero, but because we hadn't entered in the corresponding F column, Excel thought we were.

Now that we have mastered conditionals, we can solve this problem. The formula in cell G4, which was subsequently copied down many rows, was not incorrect, but it could be improved. Let's remove the offending formulas:

Step 1: Delete the contents of the range G4:G100.

As always, when we are working with formulas, try stating the solution in plain English. If might go something like this:

> "If there is nothing in the Gas cell to my left, then show nothing. Otherwise, subtract the initial mileage from the ending mileage, and divide the result by the Gas."

Step 2: Move to cell G4.

Step 3: Type:

=

- As always, this tells Excel that this cell contains a formula.

Step 4: Type:

if(

Step 5: Press ←, to cell F4.

Step 6: Type:

="","",

- In other words, if F4="" evaluates as True, then display nothing, otherwise . . .

Step 7: Type:

(

Step 8: Press ← twice.

- This is cell E4, the ending mileage.

Step 9: Type:

-

and press ← three times.

- This says, in effect, "subtract the contents of D4, the initial mileage."

Step 10: Type:

)

Step 11: Type:

/

Step 12: Press ← once.

Step 13: Type:

)

and press ↵Enter to lock the formula into the cell.

Cell G4 should now display 27.1, just as before. The difference is that now we can copy its contents down with happy results:

Step 14: Press ↑ to move back to cell G4.

Step 15: Click and drag cell G4's Fill Handle straight down, many rows.

	D	E	F	G
2	**Gas Mileage Calculator**			
3	**Initial Mileage**	**Ending Mileage**	**Gas (in gallons)**	**MPG**
4	50,021.1	50,325.0	11.2	27.1
5	50,325.0	50,625.3	12.2	24.6
6	50,(=IF(F4="","",(E4-D4)/F4)			
7	-			

This time, when you release the mouse, any cell that previously showed an error message will now show nothing!

Time Clock Exercise

A consultant charges by the hour. To properly overbill his clients, he calculates his billable hours in a worksheet:

Step 1: Duplicate these headings:

	A	B	C
1	**Start**	**Stop**	**Hours Billed**
2			
3			

We want to enter times in columns A and B so that they appear as:

```
8:38 pm
```

To do this, we must format columns A and B:

Step 1: Click the header of column A and drag to the column B header. This will select both columns.

Step 2: From the pull-down menu, select Format, Cells.

Step 3: On the Number tab, select the Time category and the appropriate format, as shown in Figure 14.

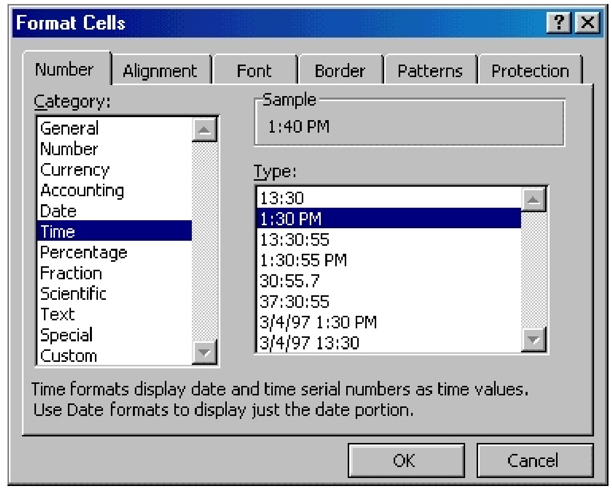


Figure 14

Step 4: Click **OK** to exit the dialog.

Step 5: To simplify working with formulas, place dummy values in A2 and B2, as shown.

	A	B	C
1	**Start**	**Stop**	**Hours Billed**
2	10:00 AM	11:00 AM	
3			

Step 6: The formula in cell C2 should take the Stop Time - Start Time, and then multiply the results by 24. Remember that Excel calculates times as a fraction of the total day. Thus, in our example, Excel is taking:

$$\left(\frac{11}{24} - \frac{10}{24}\right) * 24 = \frac{1}{24} * 24 = 1$$

which returns the answer we expected

	A	B	C
1	**Start**	**Stop**	**Hours Billed**
2	10:00 AM	11:00 AM	=(B2-A2)*24
3			

Step 7: Everything seems to work right, unless he starts in the morning, say 10:00 AM, and ends at 3:00 PM. If you enter:

```
3:00
```

in cell B2, the result will be:

	A	B	C
1	**Start**	**Stop**	**Hours Billed**
2	10:00 AM	3:00 AM	(7.00)
3			

There are two solutions to this. You must either:

- enter times in 24-hour "military" time, where 3:00 in the afternoon is 15:00; or,
- type:

  `PM`

  after the time, such as:

  `3:00 PM`

  (You don't have to use capital letters, but you must type a space between the time and the PM.)

Now, he notices another problem. If he starts to work at 10:00 PM and work until 1:00 AM, he claims to have worked three hours, but his spreadsheet says:

	A	B	C
1	**Start**	**Stop**	**Hours Billed**
2	10:00 PM	1:00 AM	(21.00)
3			

Step 8: The formula in C2 can be changed to accommodate this situation. Enter

`=B2-B1+IF(A2<A1,1,0)`

	A	B	C
1	**Start**	**Stop**	**Hours Billed**
2	10:00 PM	1:00 AM	=(B2-B1+IF(A2<A1,1,0))*24
3			

CURRENT TIME

Remember that you enter the current time by clicking Ctrl Shift : .

CONDITIONAL EXERCISE

Consider the worksheet we developed earlier. Assume that your check book is linked to your savings account. If you overdraw your checking account, your bank will automatically cover the overdraft by transferring funds from your savings. If you have insufficient funds in your savings account, though, the bank receives your first-born child.

	D	E	F	G
3	**Item**	**Deposits**	**Withdrawals**	**Balance**
4	Initial	100		100
5	Food		20	80
6	Pay	400		480
7	Clothes		510	-30
8	More clothes		300	-330

COMMENT

What can you tell from this worksheet? Not much, really, because you don't know, off hand, how much is in your savings account. If you have $3 in savings, you have one less place at the table. If you have $3,000, there is no problem.

Let's assume that the balance of your checking account is in cell K9. Here are the conditions:

- If the balance is greater than 0, there is no problem; color the results in green.
- If the balance is between -K9 and 0, you are overdrawn; color the results in brown bold italics on a yellow background.
- If the balance is less than the amount you have in savings, color the results in white bold italics on a red background.

SOLUTION

Step 1: Select cell G4.

Step 2: Select Format, Conditional Formatting.

Step 3: For Condition 1, set the Cell Value "greater than or equal to" 0.

Step 4: Click **Format**, and make the font green.

Step 5: Click **OK** to close the Format dialog and return to the Conditional Formatting dialog.

Step 6: Click **Add >>** to add another condition.

Step 7: For Condition 2, set the Cell Value "between."

Step 8: We want this condition to kick in when the balance is between -K9 and 0. Therefore:

- in the third box, press - and select cell K9;

- in the fourth box, type zero.

Step 9: Click **Format**, and make the font brown.

Step 10: On the Patterns tab, change the cell shading to yellow.

Step 11: Click **OK** to close the Format dialog and return to the Conditional Formatting dialog.

Step 12: Click **Add >>** to add another condition.

Step 13: For Condition 3, set the Cell Value "less than."

Step 14: We want this condition to kick in when the balance is less than -K9. Therefore in the third box, press **-** and select cell K9.

Step 15: Click **Format** and make the font white.

Step 16: On the Patterns tab, change the cell shading to red.

Step 17: Click **OK** twice to save your changes and close the dialogs.

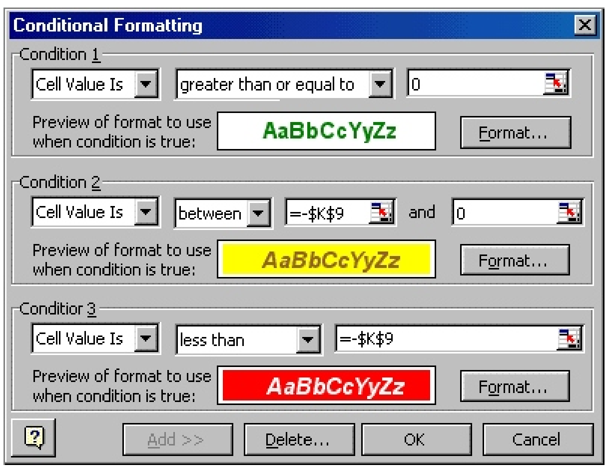


Figure 15

Step 18: Now copy cell G4 down through G8.

The results will be:

	D	E	F	G
3	**Item**	**Deposits**	**Withdrawals**	**Balance**
4	Initial	100		**100**
5	Food		20	**80**
6	Pay	400		**480**
7	Clothes		510	-30
8	More clothes		300	-330

NOTES