

Microsoft Excel 97 Intermediate

Module 2: Using Functions in Formulas

Performance Objective

In this module, you gain confidence in your ability to:

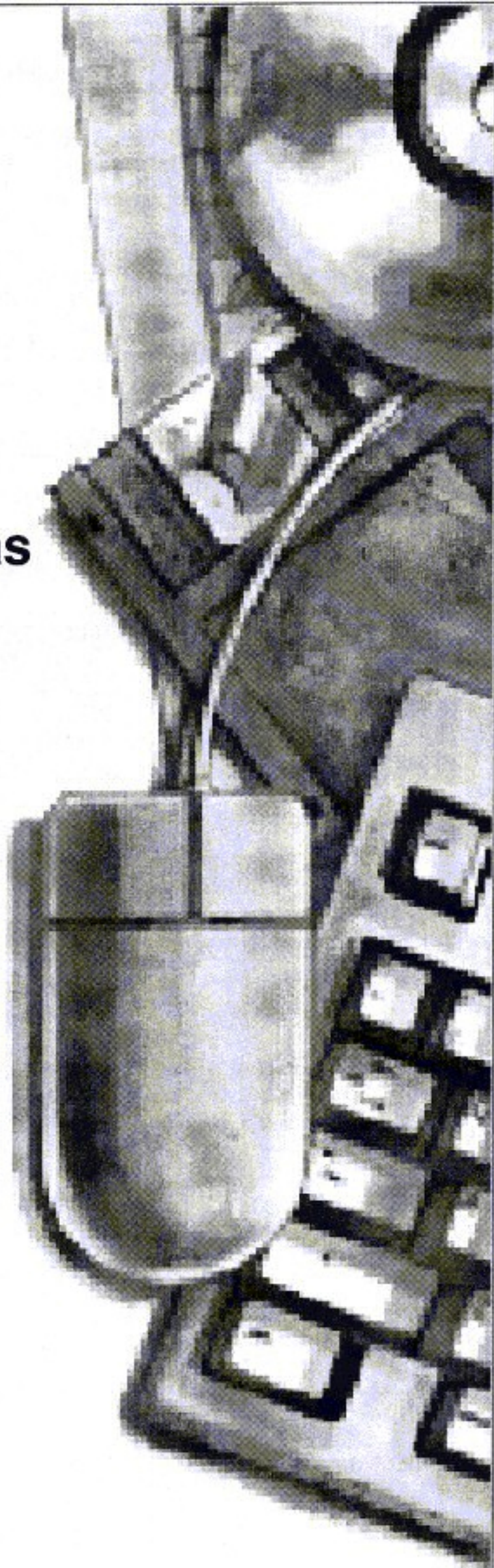
- Work with functions to create complex formulas

Exercise Files

BONUS97I

AWARD97I

CLNRE97I



Module Skills and Their Importance

After completing this module, you will be able to:

- Use functions to compare data
You can use functions like IF and SUMIF to compare data against a logical test to see if the data matches the criterion.
- Create formulas with nested functions
You can nest functions within other functions to test several criteria in a single formula.

What You Will Accomplish

The skills learned in this module prepare you to perform the following activities.

Use functions to compare data

The screenshot shows a Microsoft Excel spreadsheet titled "Sales Bonus". The formula bar displays the formula: `=IF(OR(G6>H2,F6>H2),\"YES\", \"NO\")`. The spreadsheet data is as follows:

	A	B	C	D	E	F	G	H	I	
1								Week G	Month Goal	
2								25,000	120,000	
3										
4		Sales for March						Bonus?		
5	Last Name	Week 1	Week 2	Week 3	Week 4	Best	Total	Week	Month	Do
6	Brewster	24,123	22,592	28,051	25,519	28,051	\$ 100,285	YES	NO	I
7	Guillermo	22,167	23,699	26,240	27,793	27,793	\$ 99,899	YES	NO	I
8	Kouru	27,834	28,399	28,976	29,564	29,564	\$ 114,773	YES	NO	I
9	Larson	36,130	46,067	38,022	48,997	48,997	\$ 169,216	YES	YES	DO
10	Stein	21,667	24,137	26,657	29,228	29,228	\$ 101,689	YES	NO	I
11	Yoshida	18,579	20,986	23,442	24,948	24,948	\$ 87,955	NO	NO	I
12										
13	Maximum	48,997								
14										
15										
16										

Create formulas with nested functions

Using Functions to Compare Data

When you work with data in Microsoft Excel, you might want to make comparisons between data to determine whether the data fits within limits or conforms to a standard. You use *logical functions* to test the contents of a cell to see if they fit your criteria.

NEW TERM

logical function The category of functions in Microsoft Excel including IF, AND, OR, NOT, TRUE, and FALSE. Logical functions are used to test the contents of cells against criteria and determine whether the test is true or false.

Using the IF Function

You use the *IF function* to test the contents of a cell and determine the action to be performed. The action can be performing another calculation, displaying text, or displaying a value. For example, the IF function can be used to display a message that indicates how actual expenses compare to planned expenses. You can test a cell containing an actual expense value to determine if the value is less than the planned expense value. The text “okay” is displayed if the actual expense is less than the planned expense, or the text “over” is displayed if the actual expense is greater than the planned expense.

You use the Function Palette to create a formula with the IF function. The IF function consists of the function name, the *logical test* argument, a *value if true* argument, and a *value if false* argument.

NEW TERMS

IF function A function that tests the content of a cell, performs a calculation, and displays a value or text based on whether the test is true or false.

logical test The test by which the cell content is judged. For example, the logical test $2+2=4$ is true. The test $2+2=5$ is false. In a Microsoft Excel function, the logical test is usually a comparison between cell contents. For example, $B4>C4$ is a logical test in Microsoft Excel.

value if true The value that the function returns if the logical test is true. For example, if B4 is greater than C4, then the completed formula displays the true value.

value if false The value that the function returns if the logical test is false. For example, if B4 is not greater than C4, then the completed formula displays the false value.

The following function is an IF function that includes a logical test, a value if true argument, and a value if false argument.

Function name
Logical test
Value if true
Value if false

=IF(B4>C4,"GREATER","NO")

The logical test is whatever test you want the cell contents to be judged against. The value if true argument and value if false argument are used to identify the type of action that is to be performed. The action can be displaying text, displaying a value, or calculating a formula. For example, you might want to use an IF function that determines whether or not B4>C4. If B4 is greater than C4, then the function returns "GREATER" as the value if true. If B4 is not greater than C4, then the function returns "NO" as the value if false. You can use any text or value as the value if true and value if false arguments.

How to use a logical function in a formula

Click the Paste Function button.



Select Logical in the Function Category, select a Function Name, and click OK.

Fill in the logical test arguments.

Fill in the value if true and value if false arguments.

Click OK.

In the following exercises, you use the IF function, and then copy the formula.

■ Use the IF function

1. Open the **BONUS97I** file, and save it as **Sales Bonus**.
2. Select cell **I6**.
The cell under the heading Month is selected.
3. Locate the **Paste Function** button on the Standard toolbar.
It looks like this.



4. Click the **Paste Function** button.
The Paste Function dialog box appears.
5. Select **Logical** in the Function Category list.
Logical function names are listed in the Function Name list.

6. Select **IF** in the Function Name list.
Information about the IF function is displayed at the bottom of the dialog box.
7. Click **OK**.
The Function Palette is displayed.
8. Move the **IF** Function Palette to the bottom of the screen so you can see the sales numbers for Brewster.
9. Select cell **G6**, type a **greater-than sign (>)**, and select cell **I2**.
The argument G6>I2 is displayed in the Logical_Test box.
10. Press [TAB], and type **YES** in the Value_If_True box.
If the logical test is true, the word "YES" is displayed in the cell.
11. Press [TAB], and type **NO** in the Value_If_False box.
If the logical test is false, the word "NO" is displayed in the cell.
12. Move the **IF** Function Palette back to the middle of the screen.
13. Click **OK**.
The formula =IF(G6>I2,"YES","NO") is entered in cell I6. The text "YES" is displayed in the cell because the value in G6 is greater than the value in I2.

■ Copy the formula

1. Verify that the cell **I6** is selected.
2. Select the reference to cell **I2** in the Formula Bar, and press [F4].
The value I2 changes to an absolute reference so you can copy the formula.
3. Press [ENTER].
You can also click the Enter button on the Formula Bar.

4. Select cell **I6**, and drag the fill handle to cell **I11**.
The formula with the IF function is copied to cells I7:I11 and the results, YES or NO, are displayed in the cells. Your screen should look like this.

The screenshot shows an Excel window titled "Microsoft Excel - Sales Bonus". The formula bar displays the formula `=IF(G6>=I2,"YES","NO")`. The worksheet contains the following data:

Sales for March							Bonus?		
Last Name	Week 1	Week 2	Week 3	Week 4	Best	Total	Week	Month	Do
Brewster	24,123	22,592	28,051	25,519	28,051	\$ 100,285			YES
Gutierrez	22,167	23,699	26,240	27,793	27,793	\$ 99,899			NO
Kouri	27,834	28,399	28,976	29,564	29,564	\$ 114,773			YES
Lerson	36,130	46,067	38,022	48,997	48,997	\$ 169,216			YES
Stein	21,667	24,137	26,657	29,228	29,228	\$ 101,689			YES
Yoshida	18,579	20,966	23,442	24,948	24,948	\$ 87,955			NO
Maximum	48,997								

5. Save the worksheet.

Using the SUMIF Function

The *SUMIF function* combines a mathematical function with a logical function. The result of a SUMIF function is a mathematical sum, but it uses a criterion that you specify to determine whether to include the contents of certain cells in the sum.

NEW TERM

SUMIF function A function that sums the contents of only those cells that match a criterion that you specify.

For example, suppose you want to know how much of a contribution the smaller sales offices make to your company's gross sales, specifically those offices with fewer than five sales staff members. You can set up a formula to sum only the sales numbers for offices with fewer than five sales staff members.

11. Click **OK**.

The *Function Palette* closes. The formula *SUMIF(Total_Sales,">100000",Commissions)* is entered in cell *K2*. Your screen should look like this.

The screenshot shows the Microsoft Excel interface with the following data:

	C	D	E	F	G	H	I	J	K
1						Week	Month	Goal	Commission Pa
2						25,000	100,000		7,289
3									
4	Sales for March					Bonus?			
5	Week 2	Week 3	Week 4	Best	Total	Week	Month	Double	Commission
6	22,582	26,051	25,519	26,051	\$ 100,285		YES		1,504
7	23,699	26,240	27,793	27,793	\$ 99,899		NO		1,498
8	28,399	29,976	29,564	29,564	\$ 114,773		YES		1,722
9	46,067	30,022	48,997	48,997	\$ 169,216		YES		2,539
10	24,137	26,657	29,228	29,228	\$ 101,689		YES		1,525
11	20,966	23,442	24,948	24,948	\$ 87,955		NO		1,319
12									
13									
14									
15									
16									

The formula bar shows: `=SUMIF(Total_Sales,">100000",Commissions)`

12. Save the worksheet.

Creating Formulas with Nested Functions

In addition to the IF function, there are other logical functions that you can use to test and compare data. The *AND function* and the *OR function* are two functions that you can use by themselves, or nested within the IF function, to test your data.

NEW TERMS

AND function A function used to perform multiple tests on the content of cells in a spreadsheet and display a value or text based on whether every test is true or false.

OR function A function used to perform multiple tests on the content of cells in a spreadsheet and display a value or text based on whether any part of the test is true or false.

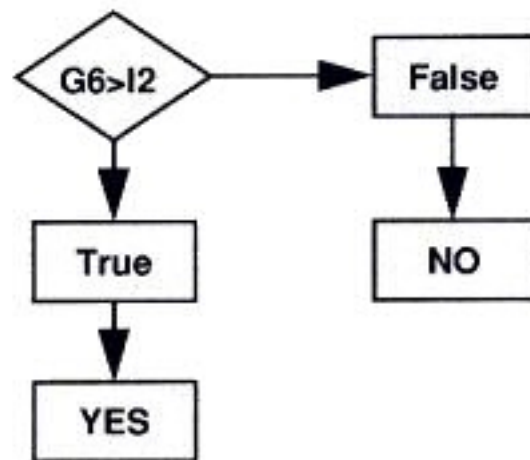
The AND function is used to test the contents of a cell, and based on whether the test is true or false, it will perform another calculation, display a value, or display text. A test is true if all function arguments are true, and a test is false if any of the function arguments are false. In the OR function, a test is true if any function arguments are true, and false if none of the function arguments are true.

For example, the AND function can be used to display text that shows how an actual sales figure compares to a planned sales figure, while comparing another actual figure with another planned figure at the same time. You can test a cell to determine if the value in the cell is greater than 100,000, and then test another cell to determine if the value in the cell is greater than 25,000. Based on the results of these two tests, you determine what action is performed when the function evaluates to true or false. If the test is true, the word "DOUBLE" is displayed. If any part of the test is false, the word "NO" is displayed.

The following illustrations show an IF function, an AND function nested within an IF function, and an OR function nested within an IF function.

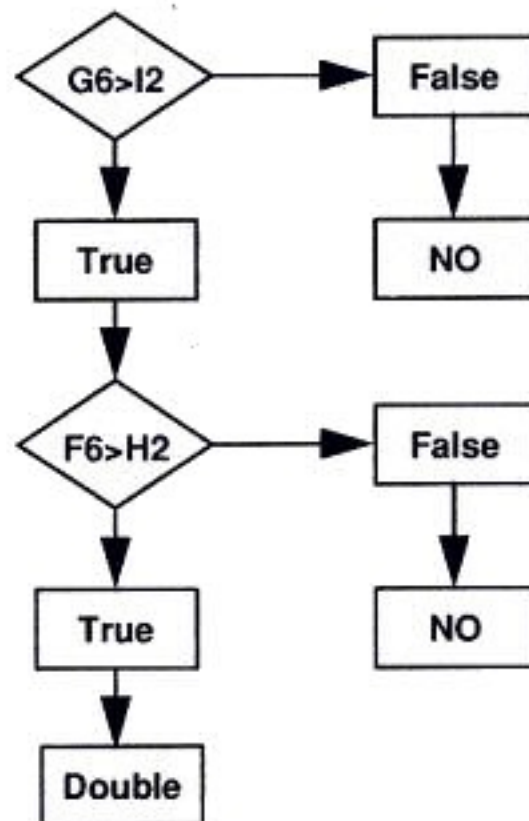
IF Function

`=IF(G6>I2,"YES","NO")`



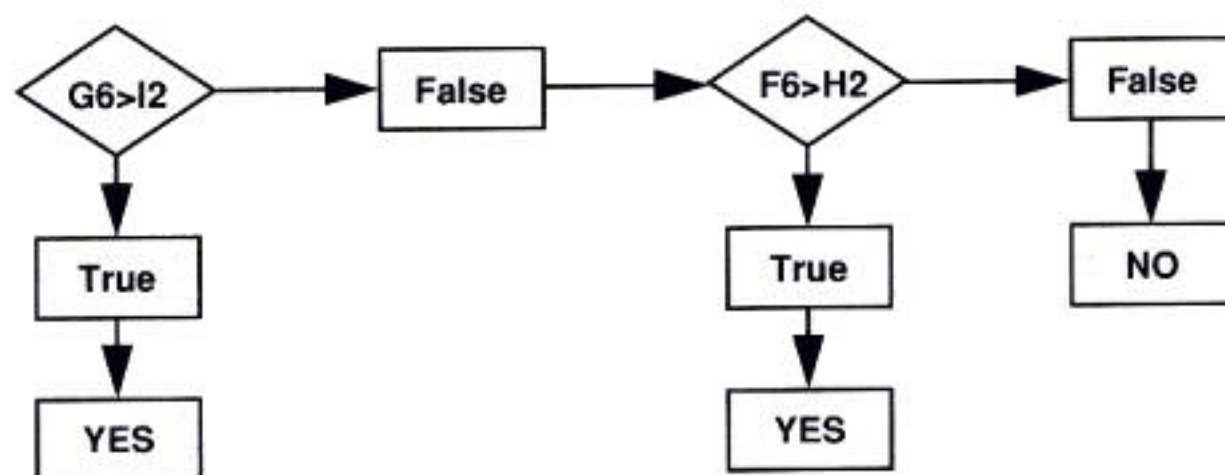
AND Function

`=IF(AND(G6>I2,F6>H2),"DOUBLE","NO")`



OR Function

=IF(OR(G6>I2,F6>H2),"YES","NO")



In the following exercises, you nest the AND function within an IF function, copy the formula, nest the OR function, copy the formula, and change the monthly goal.

■ Nest the AND function within an IF function

1. Select cell **J6**.
The cell under the heading Double is selected.
 2. Click the **Paste Function** button.
The Paste Function dialog box appears.
 3. Select **Logical** in the Function Category list.
 4. Select **IF** in the Function Name list, and click **OK**.
You use the IF function and the AND function together to create this formula.
 5. Locate the **Function Box** on the Formula Bar.
It looks like this.
- IF
6. Click the **Function Box** down arrow, select **More Functions**, verify that **AND** is selected, and then click **OK**.
The AND section of the Formula Palette is displayed.
 7. Verify that the **insertion point** is in the Logical1 box.
 8. Drag the **Function Palette** so that you can see the sales data for Brewster.

9. Click cell **G6**, type a **greater-than sign (>)**, click cell **I2**, and press [F4].
10. Press [TAB], click cell **F6**, type a **greater-than sign (>)**, click cell **H2**, and press [F4].
11. Click the word **IF** in the Formula Bar.
The IF section of the Formula Palette is displayed.
12. Click in the **Value_If_True** box, and type **DOUBLE**
13. Press [TAB], and type **NO** in the Value_If_False box.
14. Click **OK**.
The Formula Palette closes. The formula =IF(AND(G6>=\$I\$2, F6>=\$H\$2), "DOUBLE", "NO") is entered in cell H6. The text "DOUBLE" is displayed in the cell because both conditions are met.

■ Copy the formula

1. Verify that **J6** is selected, and drag the **fill handle** to cell J11.
The formula is filled into cells J7:J11 Your screen should look like this.

Sales for March						Bonus?			
Week 2	Week 3	Week 4	Best	Total	Week	Month	Double	Commission	
22,592	28,051	25,519	28,051	\$ 100,285		YES	DOUBLE	1,504	
23,699	26,240	27,793	27,793	\$ 99,899		NO	NO	1,498	
28,399	28,976	29,564	29,564	\$ 114,773		YES	DOUBLE	1,722	
46,067	39,022	48,997	48,997	\$ 169,216		YES	DOUBLE	2,538	
24,137	26,657	29,228	29,228	\$ 101,689		YES	DOUBLE	1,525	
20,985	23,442	24,948	24,948	\$ 87,955		NO	NO	1,319	

2. Save the worksheet.

■ Nest the OR function

1. Select cell **H6**.
2. Click the **Paste Function** button.
The Paste Function dialog box appears.
3. Verify that **Logical** is selected in the Function Category list, select **IF**, and click **OK**.
You use the IF function and the OR function together to create this formula. The IF Formula Palette is displayed.
4. Click the **Function Box** down arrow, select **More Functions**, select **OR**, and then click **OK**.
The OR Formula Palette is displayed.
5. Verify that the **insertion point** is in the Logical1 box.
6. Drag the **Function Palette** so that you can see the sales data for Brewster.
7. Click cell **G6**, type a **greater-than sign (>)**, click cell **I2**, and press [F4].
8. Press [TAB], click cell **F6**, type a **greater-than sign (>)**, click cell **H2**, and press [F4].
9. Click the word **IF** in the Formula bar.
The IF Formula Palette is displayed.
10. Click in the **Value_If_True** box, and type **YES**
11. Press [TAB], and type **NO** in the Value_If_False box.
12. Click **OK**.
The Formula Palette closes. The formula =IF(OR(G6>I2, F6>H2),"YES","NO") is entered in cell J6. The text "YES" is displayed in the cell because at least one of the arguments is true.

■ Copy the formula

1. Verify that cell **H6** is selected, and drag the **fill handle** to cell H11.

The formula is filled into cells H7:H11. Your screen should look like this.

The screenshot shows the following data in the worksheet:

	C	D	E	F	G	H	I	J	K
1						Week G	Month Goal		Commission Pa
2						25,000	100,000		7,209
3									
4	Sales for March					Bonus?			
5	Week 2	Week 3	Week 4	Best	Total	Week	Month	Double	Commission
6	22,592	28,051	25,519	28,051	\$ 100,285	YES	YES	DOUBLE	1,504
7	23,699	26,240	27,793	27,793	\$ 99,899	YES	NO	NO	1,498
8	28,399	28,976	29,564	29,564	\$ 114,773	YES	YES	DOUBLE	1,722
9	46,067	38,022	48,997	48,997	\$ 169,216	YES	YES	DOUBLE	2,538
10	24,137	26,657	29,228	29,228	\$ 101,689	YES	YES	DOUBLE	1,525
11	20,986	23,442	24,948	24,948	\$ 87,955	NO	NO	NO	1,319

2. Save the worksheet.

■ Change the monthly goal

1. Select cell **I2**.

This cell contains the Month Goal value referred to in the formulas in cells H6:J11.

2. Type **120000** and press [ENTER].

The value is changed and the formulas are updated. Your screen should look like this.

	C	D	E	F	G	H	I	J	K
1						Week G	Month Goal		Commission Pa
2						25,000	120,000		7,289
3									
4	Sales for March					Bonus?			
5	Week 2	Week 3	Week 4	Best	Total	Week	Month	Double	Commission
6	22,592	28,051	25,519	28,051	\$ 100,285	YES	NO	NO	1,504
7	23,699	26,240	27,793	27,793	\$ 99,899	YES	NO	NO	1,498
8	26,399	28,976	29,564	29,564	\$ 114,773	YES	NO	NO	1,722
9	46,067	38,022	48,997	48,997	\$ 169,216	YES	YES	DOUBLE	2,538
10	24,137	26,857	29,228	29,228	\$ 101,689	YES	NO	NO	1,525
11	20,966	23,442	24,948	24,948	\$ 87,955	NO	NO	NO	1,319
12									
13									
14									
15									
16									

3. Save and close the worksheet.

Module Recap 2

One of your projects in the Accounting department is keeping track of the company's various sales incentive programs. At the end of the quarter, you create a report that lists each salesperson, their monthly and quarterly sales figures, and the amount each has earned in commission. You use a formula to determine if the salespeople met their sales goals and should receive a sales award. Not all of the salespeople have reached a sales threshold that qualifies them to receive commission, so you create a formula to determine how much the company is paying in commission to qualified salespeople for the quarter.

You can refer to Appendix Section A: Answers to confirm the actions to complete each step in the Module Recap.

■ Use functions to compare data

1. Open the **AWARD97I** file, and save it as **Sales Awards** in the Class folder.
2. Select cell **G6**, and click the **Paste Function** button to use the **IF** function to create a **formula** that compares the total in F6 with the goal in H2. If F6 is greater than H2, use **YES** as the true value. If F6 is not greater than H2, use **NO** as the false value. The formula is `=IF(F6>H2,"YES","NO")`. *For How To steps, refer to page 34. For an example, refer to page 34.*
3. Change the reference to **H2** in the formula in cell **G6** to an **absolute reference**, and copy the formula to cells **G7:G11**. *For an example, refer to page 35.*
4. Select cell **I2**, and click the **Paste Function** button to use the **SUMIF** function to create a **formula** that adds up the commission paid to those salespeople who have more than **\$650,000** in sales for the quarter. The formula is `SUMIF(Total_Sales,">650,000",Commissions)`. *For an example, refer to page 37.*

■ Create formulas with nested functions

1. Select cell **H6**, and click the **Paste Function** button to use the **IF** and **AND** functions to create a **formula** that compares the value in cell **E6** with the goal in **G2**, and the value in **F6** with the value in **H2**. If both conditions are met, use **YES** as the true value. If both conditions are not met, use **NO** as the false value. The formula is `=IF(AND(E6>G2,F6>H2),"YES","NO")`. *For an example, refer to page 41.*
2. Change the references to **G2** and **H2** in the formula in cell **H6** to absolute references, and copy the **formula** to cells **H7:H11**. *For an example, refer to page 42. Your screen should look like this.*

The screenshot shows the Microsoft Excel 97 interface with the following data in the spreadsheet:

	E	F	G	H	I	J	K	L	M
1			Month Goal	Qtr Goal	Commission Paid				
2			250,000	650,000	82,983				
3									
4	Quarter		Award?						
5	Best	Total	Silver	Gold	Commission				
6	210,383	613,157	NO	NO	21,560				
7	240,699	654,106	YES	NO	23,234				
8	220,592	632,766	NO	NO	22,292				
9	360,067	974,219	YES	YES	34,620				
10	240,137	648,461	NO	NO	23,056				
11	280,399	697,209	YES	YES	25,122				
12									
13									
14									
15									
16									

The formula bar for cell H6 shows: `=IF(AND(E6>G2,F6>H2),"YES","NO")`

3. Save and close the file.

Review Checklist

You must be able to complete the following tasks on your own. As you review these topics, place a check mark next to those you can do. If you do not feel confident about an item on the following list, let your instructor know. If you can do the items on the list and have extra time, complete the Scenario/Challenge on the next page.

- Use functions to compare data
- Create formulas with nested functions

For Further Study

You can find additional information about the topics covered in this module in the online Help system.

For Further Study	
Topic	Help Index Topic
Using functions to compare data	functions, entering in formulas functions, in formulas IF worksheet function SUMIF worksheet function
Creating formulas with nested functions	functions, nested AND worksheet function OR worksheet function

4. Select cell **H2**, and use the **Function Palette** and the **SUMIF** function to add up the commission you would lose if you gave a new associate all of your accounts that grossed less than \$40,000 last year. The formula is `SUMIF(Total_Sales,"<40000",Commissions)`. For an example, refer to page 37. Your screen should look like this.

	D	E	F	G	H	I	J	K
1		Client Goal	Sales Goal	Total Qtr	Commission		Sales Bonus?	
2		40,000	50000	150000	1422			
3								
4								
5								
6	Qtr 3	Qtr 4	Total Sales	Commissi	Client Reward			
7	24,097	26,956	90,744	2,269	YES			
8	2,873	5,678	17,237	431	NO			
9	75,923	62,985	206,839	7,171	YES			
10	8,753	12,643	92,366	2,310	YES			
11	9,754	7,945	39,630	991	NO			
12	111,646	108,262	487,206	12,180				
13								
14								
15								
16								

5. Try this new challenge: Select cell **J7**, and use the **Function Palette** and the **OR** function to determine if you will receive a sales bonus for the year. First, test the contents of cell **F12** against the figure in **F2**, and then, test the figures in **B12:E12** against the amount in **G2**. The references to **F2** and **G2** are absolute. The formula is `=IF(OR(F12>F2,B12>G2,C12>G2,D12>G2,E12>G2),"YES","NO")`. For an example, refer to page 43.
6. Try this new challenge: Determine what your sales totals would be for each quarter if you dropped accounts that grossed less than \$50,000 last year. First, create the **formula** in cell **B13**, and then copy it to cells **C13:B13**. The formula is `=SUMIF(F7:F11,">50000",B7:B11)`.
7. Save and close the worksheet.