
EXCEL 2003

SIMPLE FORMULAS

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SIMPLE FORMULAS

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LESSON 1 - CREATING SIMPLE FORMULAS

USING FORMULAS



Discussion

Formulas are used to perform calculations on values entered into the cells of a worksheet. They consist of the addresses of the cells containing the values and the appropriate mathematical operators. Formulas always begin with an equal sign (=) because they contain cell addresses. The equal sign prevents Excel from interpreting the formula as text, since cell addresses begin with letters. For example, to add the numbers in cells A1 and A2, you would type the formula **=A1+A2**.

You enter the formula in the cell where you want the result to appear. Since formulas use cell addresses, they automatically recalculate whenever the value in any cell used in the formula changes. When a cell containing a formula is selected, the formula appears in the formula bar and the calculated results of the formula appear in the cell.

The mathematical operators that can be used in a formula are listed in the following table:

Operator	Performs
+ (plus sign)	Addition
- (minus sign)	Subtraction
* (asterisk)	Multiplication
/ (slash)	Division
() (parentheses)	Controls the order of mathematical operations; calculations within parentheses are performed first
% (percent)	Converts a number into a percentage; for example, when you type 10% , Excel reads the value as .10
^ (caret)	Exponentiation; for example, when you type 2^3 , Excel reads the value as 2*2*2

When more than one operator appears in a formula, it is calculated using the standard mathematical order of precedence. This order determines which operations are carried out first. The order of precedence is as follows: parentheses, exponentiation, multiplication and division, addition and subtraction. For example, the result of **(8*7)+2** is 58, but the result of **8*(7+2)** is 72.



When multiplication and division or addition and subtraction appear in the same formula, they are evaluated from left to right as they appear in the formula.



Excel provides an **AutoCorrect** feature to help you correct formulas that contain errors. AutoCorrect identifies and offers suggestions on the most common mistakes made when entering formulas. For example, if a formula is entered as **=A1+B1+**, AutoCorrect will suggest the formula **=A1+B1**. If an error is found, you can either accept the correction provided or correct the formula yourself.

ENTERING FORMULAS



Discussion

Formulas begin with an equal sign (=) to tell Excel to perform a calculation and because they usually contain cell addresses. The equal sign prevents Excel from interpreting the formula as text, since all cell addresses begin with letters. You enter a formula in the cell where you want the result to appear.

When you enter a formula into a cell, you can either type the cell addresses referenced or use the mouse to select the cells and allow Excel to enter the cell addresses into the formula automatically. If the cell addresses that comprise a formula are not visible, it is more accurate to use the mouse to select the cell references while creating a formula. You only need to type the equal sign (=) to start the formula and then each of the arithmetic operators in the formula when appropriate.

As you type or select cell addresses, Excel places a colored border with squares at each corner around each referenced cell. Excel uses a different color border for each cell referenced in the formula.



Cell addresses are not case sensitive; you can enter a cell address as either C5 or c5. However, when you press the **[Enter]** key, Excel automatically changes all cell references to uppercase.



You can display the actual text entry entered into a cell (whether it is a number, label, or formula) by selecting the **Tools** menu, the **Options** command, and then the **Formulas** option on the **View** page. This option is useful as a teaching tool or when auditing a worksheet for formula errors.



Procedures

1. Select the cell into which you want to enter the formula.
2. Type an equal sign (=) to begin the formula.
3. Enter the first cell referenced in the formula.
4. Enter the first mathematical operator.
5. Enter the next cell referenced in the formula.
6. Continue entering cell references and mathematical operators as needed.
7. When you have finished creating the formula, press **[Enter]**.

USING FUNCTIONS



Discussion

Excel has built-in functions that are shortcuts for formulas. Functions are special prewritten formulas that perform an operation on values or ranges of values and return the result to a cell in the worksheet. You can use

functions to simplify and shorten formulas in your worksheets, especially those that perform lengthy or complex calculations. Examples of functions include:

```
=SUM(B5:B8)
=AVERAGE(B5:B8)
=PMT(.08,C8,85000)
=ROUND(B5,2)
```

A function always starts with an equal sign (=) followed by the function's name and, enclosed in parentheses, its arguments. The function uses the arguments in its calculations. Arguments can be cell addresses, values, labels, or a combination of these; you can even use other functions or formulas as arguments.

Functions are most commonly used to perform calculations on a range of cells. For example, it is easier to use the =SUM(A1:A7) function to add the numbers in cells A1 through A7 than to type the formula =A1+A2+A3+A4+A5+A6+A7.

When you use a function, Excel provides help in the form of a function tooltip. The tooltip displays the structure of the function (i.e., the function name and the order of its required arguments).

USING THE AUTOSUM BUTTON



Discussion

Excel has built-in functions that are shortcuts for formulas. The most commonly used function is the **SUM** function, which calculates the total of the values in a range of cells. Since the **SUM** function is used frequently, there is an **AutoSum** button on the **Standard** toolbar that enters the formula in the active cell for you. AutoSum is an easy way to sum values in a row or column of a worksheet.

When you click the **AutoSum** button, a suggested range for the function appears. A blinking, colored border called a range finder defines the suggested range. When you click the **AutoSum** button at the end of a row, the row of values to the left of the active cell is suggested. If you click the **AutoSum** button at the bottom of a column, the column of values above the active cell is suggested. If there are values both above and to the left of the active cell, the column of values above the active cell is suggested. This suggested range can be changed as needed.

The **AutoSum** button provides an arrow which, when clicked, displays a list of other functions you can perform on the cells within the selected range.




Double-clicking the **AutoSum** button enters the result of the formula without having to press the **[Enter]** key.



When you use the **AutoSum** button, a tooltip appears with information about the structure of the selected function.



Procedures

1. Select the cell into which you want to enter the formula.
2. Click the **AutoSum** button  on the **Standard** toolbar.
3. Press [**Enter**].

USING THE AUTOSUM LIST



Discussion

The **AutoSum** button provides an arrow, which displays a list of other functions you can perform on consecutively filled cells in a column or row. For example, it is easier to use the **Average** function from the **AutoSum** list to average the numbers in cells B1 through B7 than to type the formula `=AVERAGE(B1:B7)`.

Other commonly used functions in the **AutoSum** list are **Count**, **Max**, and **Min**. **Count** returns the number of cells containing numeric values, **Max** returns the highest value in the range, and **Min** returns the lowest.

AutoSum automatically uses the cell range immediately adjacent to the active cell for the suggested range. If this suggested range is incorrect, you can change it by dragging to select the cells containing the values you want to calculate.




Another method of inserting a formula using the **AutoSum** list is to select the column or row of values, including the blank cell, to contain the formula. When you select a function from the **AutoSum** list, the formula is inserted without stopping to confirm the cell range.



The **More Functions** command in the **AutoSum** list opens the Insert Function dialog box, which can be used to access all Excel functions.



Procedures

1. Select the cell into which you want to enter the formula.
2. Click the arrow on the **AutoSum** button  on the **Standard** toolbar.
3. Select the desired function.
4. Drag to select the range you want to calculate, if necessary.
5. Press [**Enter**].

ENTERING BASIC FUNCTIONS



Discussion

Although the **AutoSum** list assists you in creating formulas for the most commonly used functions, you may want to manually enter a function.

The **SUM**, **AVERAGE**, **MAX**, **MIN**, and **COUNT** functions are entered with the same syntax, including beginning the function with an equal sign (=) and then typing the name of the function and an open parenthesis. You then enter the cell range by dragging to select the cells or by typing the first and last cells in the range. These functions are defined in the following table:

Function	Syntax	Description
SUM	=SUM(A1:A20)	Totals all the numbers in a range
AVERAGE	=AVERAGE(A1:A20)	Returns the average of a range of numbers; if a cell in the range is empty, it is not used in calculating the average; if a cell in the range contains the number zero, it is used in calculating the average
MAX	=MAX(A1:A20)	Returns the highest value in a range of numbers
MIN	=MIN(A1:A20)	Returns the lowest value in a range of numbers
COUNT	=COUNT(A1:A20)	Returns the number of cells in the range that contain numbers



You can enter a period (.) in place of a colon (:) when you are manually entering the endpoints of a range in a function (A1.A5). When you press the **[Enter]** key, Excel automatically replaces the period (.) with a colon (:).



The name of a function is not case-sensitive. For example, you can type **SUM**, **Sum**, or **sum** into a cell.



If you do not type the ending parenthesis when entering a function, Excel will add it for you.



Procedures

1. Select the cell into which you want to enter the formula.
2. Type an equal sign (=) and the function name, followed by an open parenthesis.
3. Select the range of cells to be calculated.
4. Press **[Enter]**.

INSERTING FUNCTIONS IN FORMULAS



Discussion

If you are not sure of the proper syntax of a function or if you need help entering a function into a formula, you can click the **Insert Function** button in the formula bar. The **Insert Function** button aids you in selecting the proper function.

The functions in the Insert Function dialog box are grouped by category. Selecting a category displays only the functions within that category. If you do not know the category, you can select the **All** option to display all the available functions in alphabetical order. When you highlight a function, its structure and description appear below the **Select a function** list.

After you have selected the desired function, the Function Arguments dialog box opens and displays an edit box for each argument in the function. You can enter a cell address, cell range, or numerical value for each argument into the corresponding edit box. An explanation of the selected function and an explanation of the selected argument appear below the list of edit boxes. As you fill in the arguments, the result of the formula appears below these explanations.

Each edit box contains a **Collapse Dialog** button, which can be clicked to collapse the Function Arguments dialog box to a title bar so that you can see the worksheet. You can then select the desired cell range, which appears in the collapsed edit box. After selecting the range in the worksheet, you can then use the **Expand Dialog** button to redisplay the full dialog box.

You can request help by selecting the **Help on this function** hyperlink in the Insert Function or Function Arguments dialog box.



Typing an equal sign into a cell displays a **Functions** list to the left of the formula bar. This list stores the most recently used formulas. Selecting a function from this list opens the Function Arguments dialog box; selecting **More Functions** opens the Insert Functions dialog box.




You do not have to collapse the Function Arguments dialog box to select cells in the worksheet.





You can also type a description of exactly what you want to do in the **Search for a function** box and then click the **Go** button in the Insert Function dialog box.



Procedures

1. Select the cell into which you want to enter the formula.
2. Click the **Insert Function** button  in the formula bar.
3. Select a category from the **Or select a category** list.
4. Select the name of the function from the **Select a function** list box.
5. Select **OK**.

6. Click the **Number 1** edit box **Collapse Dialog** button .
7. Select the range you want to use in the calculation.
8. Click the **Expand Dialog** button .
9. Select **OK**.

EDITING FUNCTIONS






Discussion

The Function Arguments dialog box simplifies creating functions by clearly listing each necessary argument. You can also open the Function Arguments dialog box to edit the arguments of an existing function.



Procedures

1. Select the cell containing the function you want to edit.
2. Click the **Insert Function** button  in the formula bar.
3. Select the **Collapse Dialog** button  for the argument you want to edit.
4. Drag the range you want to use in the calculation.
5. Click the **Expand Dialog** button .
6. Select **OK**.

USING THE AUTOCALCULATE FEATURE



Discussion

The **AutoCalculate** feature performs a simple calculation on a selected range of cells without making you supply a formula. The result of the calculation appears on the status bar. AutoCalculate results are temporary and are not placed in the worksheet. AutoCalculate is helpful when you want to spot-check your worksheet for accuracy or need a quick answer to a basic calculation. The **AutoCalculate** functions are accessed by right-clicking the **AutoCalculate** box located on the status bar.

The **AutoCalculate** functions and their results are listed in the following table:

Function	AutoCalculate Result
None	Does not display a number
Average	Displays the average of the cells in the selected range
Count	Displays the number of cells in the selected range

Function	AutoCalculate Result
Count Nums	Displays the number of cells in the selected range that contain numeric entries
Max	Displays the highest cell value in the selected range
Min	Displays the lowest cell value in the selected range
Sum	Displays the sum of the cells in the selected range



Except for the **Count** function, AutoCalculate ignores all cells that do not contain a numeric entry.



AutoCalculate can also calculate multiple, selected ranges.



Procedures

1. Select the range you want to calculate.
2. Right-click the **AutoCalculate** box on the status bar.
3. Select the desired function.

USING RANGE BORDERS TO MODIFY FORMULAS



Discussion

When you create or edit a formula, Excel identifies its range references by displaying them with differently colored borders, with square handles at each corner.

You can change the arguments in a formula by dragging a range border to include a different group of cells. You can move the range border to reference an entirely different range, or you can change the size of the border to include more or fewer cells. When you modify a range border, the corresponding range reference(s) in the formula change accordingly.



Procedures

1. Double-click the cell containing the formula you want to edit.
2. To move a range reference, drag its colored border to include the new range.
3. To change the size of a referenced range, drag the square range handle at any corner of the border in the desired direction to include more or fewer cells.
4. Press **[Enter]**.

CHECKING ERRORS



Discussion

Excel provides an error checking feature that automatically checks your formulas against a pre-existing set of rules. If a formula breaks a rule, an error indicator appears in the form of a colored triangle in the corner of the cell containing the suspect formula.

The error checking feature compares formulas to preset rules. The rules include checking to see if a number is stored as text, if a formula uses a range that is inconsistent with the formulas next to it, or if the formula omits a cell in a continuous range.

When you click a cell with a green triangle in the upper left corner, an error checking smart tag appears next to the cell. Pointing to the smart tag displays the reason the formula was flagged. Clicking the error checking smart tag displays a list of commands that allow you to automatically correct the error, ask for help in correcting the error, ignore the error, or edit the error in the formula bar.





The formula checking rules can be enabled or disabled as desired. You can view the error checking options by selecting the **Tools** menu, the **Options** command, and the **Error Checking** page. You can then select or deselect error checking options under **Rules**. The automatic color for the triangular error indicator is green, but you can use the **Error Indicator Color** list to select a different color.



You can also select the **Error Checking Options** command on the error checking smart tag menu to open the **Error Checking** page of the Options dialog box.



Procedures

1. Select the cell displaying a green triangle in the upper, left corner.
2. Point to the error checking smart tag  to display the ScreenTip.
3. Click the error checking smart tag  to display a list of error checking options.
4. Select the desired option.

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