

## EXCEL



By Bill Jelen

## VLOOKUP Variations

Being able to use the VLOOKUP function separates the power Excel user from the casual user. Microsoft estimates that 90% of those in the Excel universe have never used the VLOOKUP function. As accountants, however, we'd be lost without it. Whether it's used to look up a commission rate or find the name for a cost center, VLOOKUP is ubiquitous in accounting worksheets. This month, we'll take a look at 12 variations on the standard VLOOKUP formula that will help you become even better at using this valuable function.

Table 1 shows the 12 variations. The formulas assume that you are looking up a value in cell A2. The lookup table is in cells X1:Z100, and row 1 contains headings.

Formula 1 shows the basic VLOOKUP formula that will return the first exact match. Imagine you're looking for the value from cell A2 in the left-most column of the lookup table (column X). The second argument specifies the table array, X2:Z100. Use dollar signs if you plan on copying the formula into other cells. This keeps the array fixed. When the value is found, you want the formula to return the second column from the

table, so specify 2 as the third argument. The fourth argument of False specifies that you need an exact match.

Few people know that you can also do a wild-card search. The syntax in Formula 2 will find the first item in the table that contains an x.

Note that VLOOKUP isn't case sensitive. ABC will match ABC. If you need to find an exact match that is case sensitive, combine INDEX, MATCH, and EXACT, as shown in Formula 3. After typing this formula, you must hold down Ctrl+Shift+Enter to tell Excel to evaluate the formula as an array formula.

Some lookups won't have every possible value in the table. You might specify that sales between \$0 and \$9,999 get a 2% commission, sales between \$10,000 and \$49,999 get a 2.5% commission, and sales of \$50,000 or more get a 3% commission. This table would need only three rows, with 0, 10000, and 50000 in the first column and the commission percentages in the second. In Formula 4, True is used in the fourth argument (instead of False). If Excel can't find the exact value in the table, using True tells it to return the row that is just smaller than the value you are looking up. This is

called an "approximate match." When using this formula, make sure that the lookup table is sorted ascending. If you want to find the row that's just greater than the value you're looking up, such as when calculating a finance charge for late payments where you pay 1% for each portion of a month that the payment is late, sort the table descending and use the syntax in Formula 5.

The approximate match is also a good trick for finding the final entry in a row or column. To find the last entry in a column, do a VLOOKUP that looks for a number larger than the expected values in the column. As Formula 6 shows, if you search for 999999999 and Excel can't find anything larger, then the function will return the last numeric entry in the column. To get the last text entry in a column, search for ZZZZZ instead, as shown in Formula 7.

MATCH and VLOOKUP are similar functions. Both offer the exact match or approximate match feature. While VLOOKUP uses False to specify an exact match, MATCH uses zero. While VLOOKUP uses True for an approximate match, MATCH uses 1. The main difference is that VLOOKUP returns a value

**Table 1**

Outcome	Formula	Notes
1. Find the first exact match	=VLOOKUP(A2,\$X\$2:\$Z\$100,2,False)	
2. Wild-card lookup	=VLOOKUP("*?x*", \$X\$2:\$Z\$100,2,False)	
3. Case-sensitive match	=INDEX(\$Y\$2:\$Y\$100,MATCH(TRUE,EXACT(A2,\$X\$2:\$X\$100),0))	Ctrl+Shift+Enter
4. Find closest value that's smaller	=VLOOKUP(A2,\$X\$1:\$Z\$100,2,True)	Sorted Ascending
5. Find closest value that's larger	=INDEX(\$Y\$1:\$Y\$100,MATCH(A2,\$X\$1:\$X\$100,-1))	Sorted Descending
6. Last numeric entry	=VLOOKUP(999999999,\$Y:\$Y,1,True)	
7. Last text entry	=VLOOKUP("ZZZZZZ",\$X:\$X,1,True)	
8. VLOOKUP-left	=INDEX(\$W\$2:\$W\$100,MATCH(A2,\$X\$2:\$X\$100,0))	
9. Two-way lookup	=INDEX(\$Y\$2:Z\$2,MATCH(A2,\$X\$2:\$X\$100,0),MATCH(B2,\$Y\$1:Z\$1,0))	
10. Sum all of the matches	=SUMIF(\$X\$2:\$X\$100,A2,\$Y\$2:\$Y\$100)	
11. Sum all of the lookups	=SUM(LOOKUP(A2:A5000,\$X\$2:\$Y\$100))	Ctrl+Shift+Enter
12. Find the last match	=INDEX(\$Y\$2:\$Y\$100,MATCH(2,IF(\$X\$2:\$X\$100=A2,1,NA{}),1))	Ctrl+Shift+Enter

from the lookup table, whereas MATCH returns the relative location in the lookup table. Knowing the row number or column number of the matching cell wouldn't be useful if not for the INDEX function. Formulas 8 and 9 combine INDEX and MATCH to do a VLOOKUP-left, where the returned value is to the left of the key field, and a two-way lookup, which finds a particular row and column based on values in two separate fields.

If there are multiple matches in the lookup table, VLOOKUP will find the first match and stop. If you need to add the results from all of the matches, switch to the SUMIF function shown in Formula 10.

Excel supports the old LOOKUP function for backwards compatibility. LOOKUP is so old, it's one of the 20 functions that were in version 1 of Visicalc in 1979. Because there's no way to specify which column to return, make sure that the column from which you want to return values is the final column in the lookup table. LOOKUP would be an oddity, except it has the ability to look up an array. Formula 11 performs a similar lookup on all the cells from A2 to A5000 and then returns the sum of all the lookups. You have to use Ctrl+Shift+Enter when finishing the formula.

Formula 12 is another array formula that will find the last match in the list and

return the value from that match. This might be useful to find the latest mileage from each vehicle in a fleet of vehicles. The IF statement will return either a 1 for matches or #N/A for nonmatches. When you use the same concept from Formula 6 to look for a large number, the formula will return the position of the last numeric entry, i.e., the last 1, which will be the last matching value. **SF**

*Bill Jelen is the author of VLOOKUP Awesome Quick and the host of MrExcel.com. Read more VLOOKUP articles at <http://lookupweek.wordpress.com>. Send questions for future articles to [IMA@MrExcel.com](mailto:IMA@MrExcel.com).*