Excel Help Bedford

Excel 2010: Functions

2010

Get familiar with a useful range of Excel functions

Excel Guides

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3. Mathematical and statistical functions

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1	**Month**	**Subscribers**
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3	February	193
4	March	195
5	April	123
6	May	86
7	June	200
8	July	123
9	August	86
10	September	93
11	October	56
12	November	169
13	December	156
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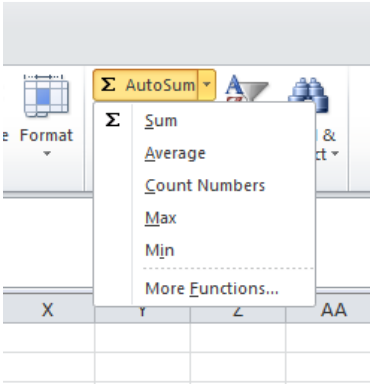
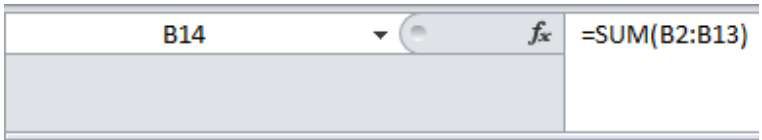
There are five functions that are extremely common, and are collectively found under the Autosum menu within the Home tab. The first is *mathematical*, the others *statistical*:

- **SUM** (cumulative value of figures added together)
- **AVERAGE** (mean value of set of figures)
- **COUNT** (number of figures in range)
- **MAX** (highest figure in range)
- **MIN** (lowest figure in range)



Although the dataset above is very simple, it will introduce the principles used in any instance where these functions are used.

3.1. SUM



	A	B	C	D	E
1	**Month**	**Subscribers**			
2	January	130			
3	February	193			
4	March	195			
5	April	123			
6	May	86			
7	June	200			
8	July	123			
9	August	86			
10	September	93			
11	October	56			
12	November	169			
13	December	156			
14	SUM	1610			

After typing =SUM(, you can sum individual cells by selecting them all, separated by a **comma**, e.g.:

=SUM(B2,B4,B6) sums values in those three cells.

However, it is often the case that an entirely unbroken range of cells requires summing. In this situation, instead of typing or selecting each individual cell, we can tell Excel to sum everything between (and including) a first and last cell:

=SUM(B2:B13) sums all values from B2 to B13. A **colon** separates these cell references.

Three tips for faster entry:

After typing =SUM(, you can **click and drag** across the range of cells you want to sum. The cell references will be filled in for you.

You can also use CTRL + SHIFT + arrow keys to select a range.

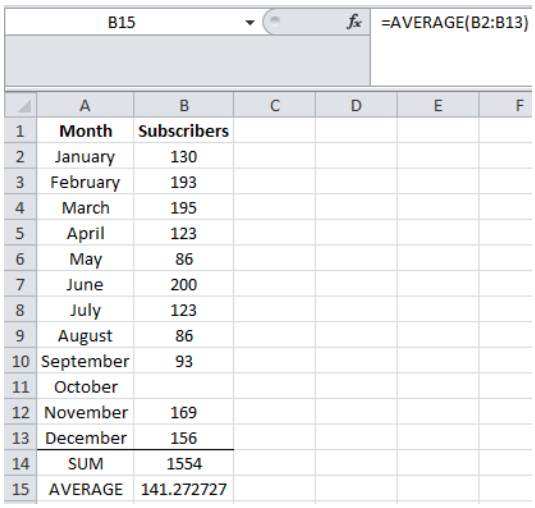
If you are entering a sum in a cell next to the range of figures to add, the keyboard shortcut **ALT + =** will guess – usually correctly! – the range of cells to sum, and automatically enter the cell range within a SUM function.

The SUM function will also take an array of cells, e.g. if you enter =SUM(B2:F13), the function will add together all the cells in that 12 rows x 5 columns range).

SUMIF is an extended option that allows you to sum only values where a certain condition is met (see Overview).

3.2. AVERAGE

AVERAGE works on exactly the same principles as SUM (and AVERAGEIF as SUMIF):



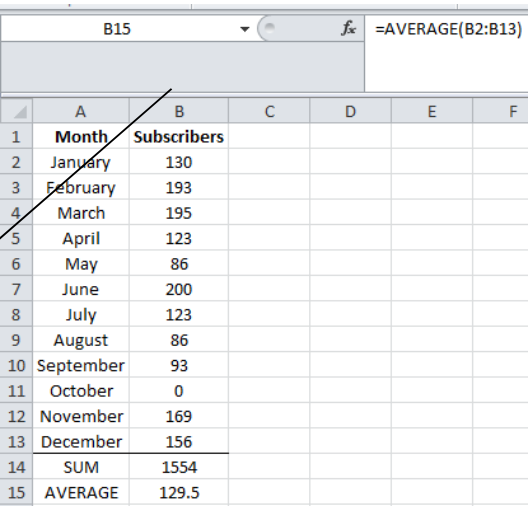
	A	B	C	D	E	F
1	**Month**	**Subscribers**				
2	January	130				
3	February	193				
4	March	195				
5	April	123				
6	May	86				
7	June	200				
8	July	123				
9	August	86				
10	September	93				
11	October					
12	November	169				
13	December	156				
14	SUM	1554				
15	AVERAGE	141.272727				

Note that in this example, we have removed the entry for *October*. This has reduced the SUM total as B11 has nothing to add.

The average takes the sum of the values and divides by the number of values.

So here, the sum is 1554, which is comprised of 11 values, and 1554/11 = 141.272727.

We could change the format of the cell to display fewer (or more!) decimal places, but the *actual value* stored in the cell would remain as the precise calculation.



	A	B	C	D	E	F
1	**Month**	**Subscribers**				
2	January	130				
3	February	193				
4	March	195				
5	April	123				
6	May	86				
7	June	200				
8	July	123				
9	August	86				
10	September	93				
11	October	0				
12	November	169				
13	December	156				
14	SUM	1554				
15	AVERAGE	129.5				

Note the difference if the value **0** was to be entered instead of having a blank cell:

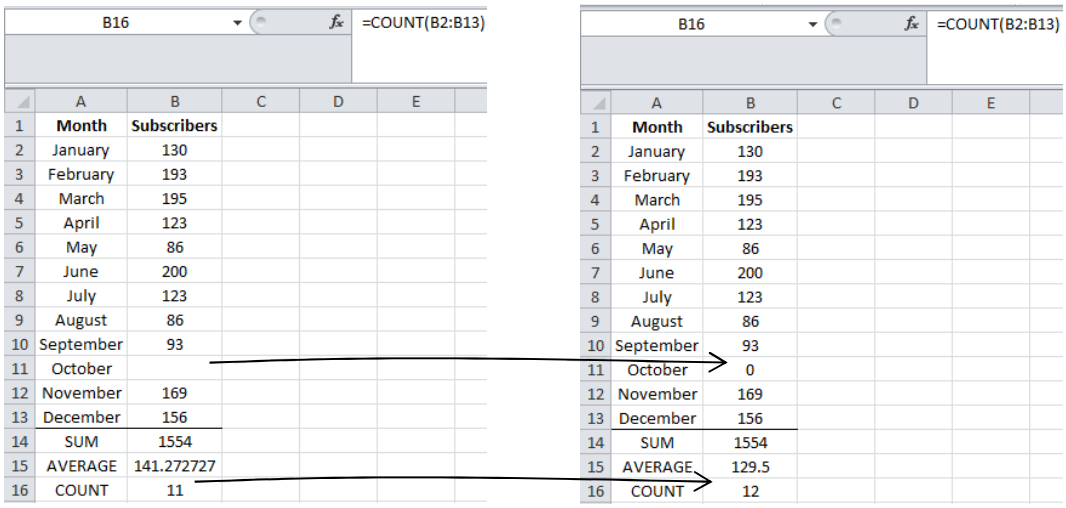
Excel now counts another value, albeit zero. This extra value means that the average recalculates to 1554/**12**, and consequently adjusts downwards to 129.5.

This illustrates the operation of the next autosum function, COUNT.

3.3. COUNT

The COUNT function uses the same structure in its syntax but gives us a total of all the **numeric** entries in a range of cells.

If we use **=COUNT(B2:B13)** to the example with a blank cell B13, it comes back with 11. Change this so a zero is entered instead of a blank, and we get 12.[1]



	A	B	C	D	E
1	**Month**	**Subscribers**			
2	January	130			
3	February	193			
4	March	195			
5	April	123			
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7	June	200			
8	July	123			
9	August	86			
10	September	93			
11	October				
12	November	169			
13	December	156			
14	SUM	1554			
15	AVERAGE	141.272727			
16	COUNT	11			

	A	B	C	D	E
1	**Month**	**Subscribers**			
2	January	130			
3	February	193			
4	March	195			
5	April	123			
6	May	86			
7	June	200			
8	July	123			
9	August	86			
10	September	93			
11	October	0			
12	November	169			
13	December	156			
14	SUM	1554			
15	AVERAGE	129.5			
16	COUNT	12			

Note the importance that Excel places on distinguishing figures from text. Entering the function **=COUNT(A2:A13)** would result in **0**, because COUNT looks for *numbers*. If you want to count *any* entry, be it text or numbers, you need to use the **COUNTA** function, which uses exactly the same syntax.[2]

You can also use **COUNTBLANK** to count where there are cells with no entry showing in them, which is the opposite operation to COUNTA. Blanks present that are the result of functions entering a blank ("") are still counted, despite a function being in that cell.

=COUNTBLANK(B2:B13) in the array above left would be evaluated as **1**; in the array above right, it would be **0**.

One more option is **COUNTIF**, which is even more straightforward than SUMIF or AVERAGEIF: simply enter the range and the test, and entries that meet the condition are counted, i.e. **=COUNTIF(B2:B13,">150")** gives the number of times subscribers exceeded 150 in a month.

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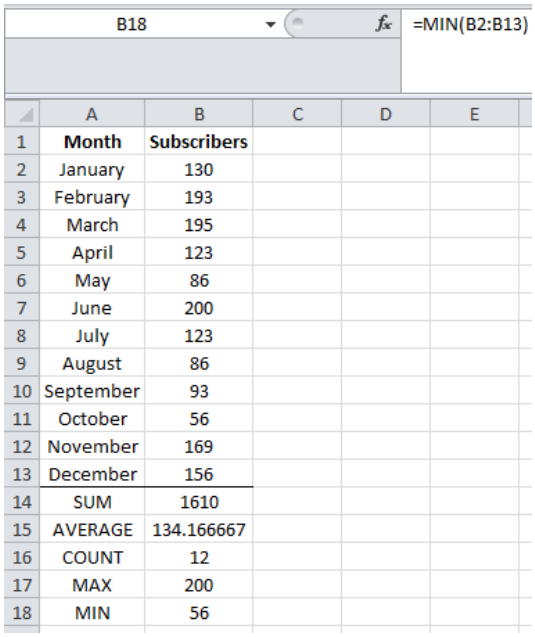
[1] To achieve a result of 12 when a blank cell is included in a range such as this, you could use =***ROWS***(B2:B13), which simply counts the number of rows used in an array.

[2] If you want to count only text entries in an array of text *and* numbers, there are two options. Using **COUNTIF** combined with the asterisk wildcard (*) searches for text values, excluding numbers and TRUE or FALSE logical results. You would use **=COUNTIF(range, "*")**.

Alternatively, you could use =S**UMPRODUCT**(--**ISTEXT**(range)). ISTEXT returns TRUE if a cell value is considered text (FALSE if not), and the -- (double unary operator) forces TRUE and FALSE into an array of 1's and 0's, which SUMPRODUCT then adds up.

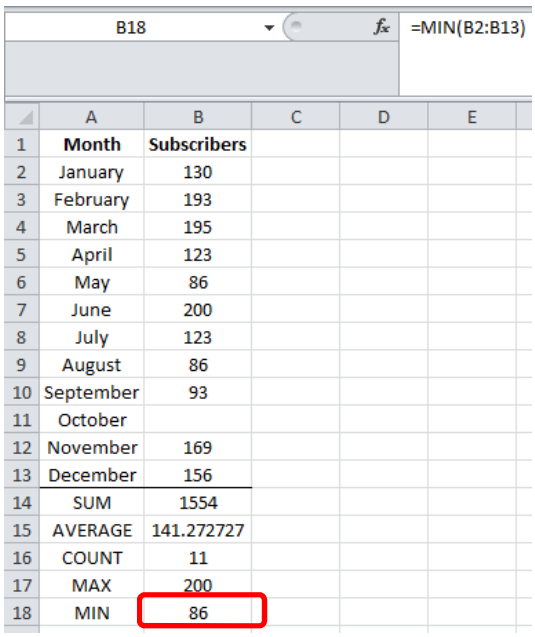
3.4. MAX and MIN

MAX and MIN again use the same syntax, and again vary based on the presence of blanks or zeros, which is especially relevant for the MIN function.



B18 =MIN(B2:B13)

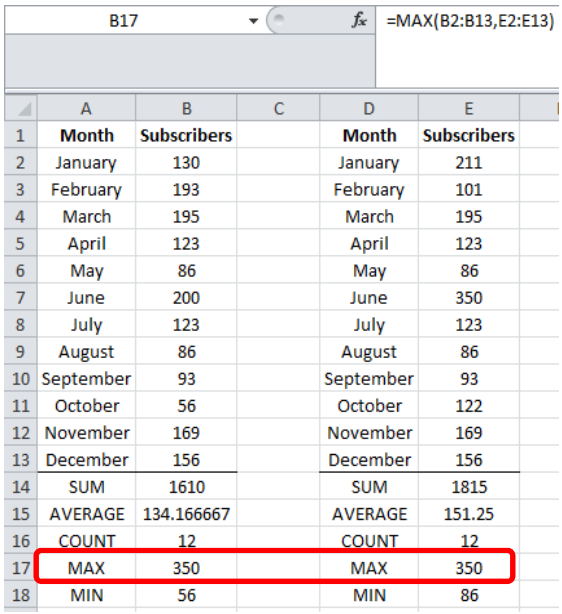
	A	B	C	D	E
1	**Month**	**Subscribers**			
2	January	130			
3	February	193			
4	March	195			
5	April	123			
6	May	86			
7	June	200			
8	July	123			
9	August	86			
10	September	93			
11	October	56			
12	November	169			
13	December	156			
14	SUM	1610			
15	AVERAGE	134.166667			
16	COUNT	12			
17	MAX	200			
18	MIN	56			



B18 =MIN(B2:B13)

	A	B	C	D	E
1	**Month**	**Subscribers**			
2	January	130			
3	February	193			
4	March	195			
5	April	123			
6	May	86			
7	June	200			
8	July	123			
9	August	86			
10	September	93			
11	October				
12	November	169			
13	December	156			
14	SUM	1554			
15	AVERAGE	141.272727			
16	COUNT	11			
17	MAX	200			
18	MIN	86			

On the left, the lowest value returned by MIN is 56 (October). On the right, MIN does not read the blank and therefore returns 86 (August) as the lowest value. MAX returns 200 in both cases.



B17 =MAX(B2:B13,E2:E13)

	A	B	C	D	E
1	**Month**	**Subscribers**		**Month**	**Subscribers**
2	January	130		January	211
3	February	193		February	101
4	March	195		March	195
5	April	123		April	123
6	May	86		May	86
7	June	200		June	350
8	July	123		July	123
9	August	86		August	86
10	September	93		September	93
11	October	56		October	122
12	November	169		November	169
13	December	156		December	156
14	SUM	1610		SUM	1815
15	AVERAGE	134.166667		AVERAGE	151.25
16	COUNT	12		COUNT	12
17	MAX	350		MAX	350
18	MIN	56		MIN	86

MIN and MAX can accommodate additional arguments. For example, if there was another area being tracked for subscribers, we could get the maximum figure out of both ranges:

Using **=MAX(B2:B13,E2:E13)** separated by a comma looks at *both* ranges and returns the maximum value from *all* those cells.

You could also hard enter a number instead of a range so that a constant value is returned unless the maximum / minimum value within the cell range exceeds / undershoots the constant itself. For example, typing in the function **=MAX(B2:B13,500)** would return **500**.

As with all functions, if inserting new rows ensure that the data range being tested is still accurate. Inserting new rows at the edge of a range will often, if not always, mean that function ranges need resizing.