- **Formula** is an expression that calculates values in a cell or in a range of cells.

  For example, `=A2+A2+A3+A4` is a formula that adds up the values in cells A2 through A4.

- **Function** is a predefined formula already available in Excel. Functions perform specific calculations in a particular order based on the specified values, called arguments, or parameters.

SUM

The first Excel function you should be familiar with is the one that performs the basic arithmetic operation of addition:

```
SUM(number1, [number2], …)
```

In the syntax of all Excel functions, an argument enclosed in [square brackets] is optional, other arguments are required. Meaning, your Sum formula should include at least 1 number, reference to a cell or a range of cells. For example:

`=SUM(B2:B6)` - adds up values in cells B2 through B6.

`=SUM(B2, B6)` - adds up values in cells B2 and B6.

If necessary, you can perform other calculations within a single formula, for example, add up values in cells B2 through B6, and then divide the sum by 5:

```
=SUM(B2:B6)/5
```

To sum with conditions, use the SUMIF function: in the 1st argument, you enter the range of cells to be tested against the criteria (A2:A6), in the 2nd argument - the criteria itself (D2), and in the last argument - the cells to sum (B2:B6):

```
=SUMIF(A2:A6, D2, B2:B6)
```

AVERAGE

The Excel AVERAGE function does exactly what its name suggests, i.e. finds an average, or arithmetic mean, of numbers. Its syntax is similar to SUM's:

```
AVERAGE(number1, [number2], …)
```

The Excel AVERAGE function performs these calculations behind the scenes. So, instead of dividing sum by count, you can simply put this formula in a cell:

```
=AVERAGE(B2:B6)
```

To average cells based on condition, use the following AVERAGEIF formula, where A2:A6 is the criteria range, D3 is he criteria, and B2:B6 are the cells to average:

```
=AVERAGEIF(A2:A6, D3, B2:B6)
```

MAX & MIN

The MAX and MIN formulas in Excel get the largest and smallest value in a set of numbers, respectively. For our sample data set, the formulas will be as simple as:

```
=MAX(B2:B6)
```

```
=MIN(B2:B6)
```

COUNT & COUNTA

```
COUNT(value1, [value2], …)
```

While the COUNT function deals only with those cells that contain numbers, the COUNTA function counts all cells that **are not blank**, whether they contain numbers, dates, times, text, logical values of TRUE and FALSE, errors or empty text strings (""):

```
COUNTA (value1, [value2], …)
```

For example, to find out how many cells in column B contain numbers, use this formula:

```
=COUNT(B:B)
```

To count all non-empty cells in column B, go with this one:

```
=COUNTA(B:B)
```

In both formulas, you use the so-called "whole column reference" (B:B) that refers to all the cells within column B.

The following screenshot shows the difference: while COUNT processes only numbers, COUNTA outputs the total number of non-blank cells in column B, including the the text value in the column header.

IF

```
IF(logical_test, [value_if_true], [value_if_false])
```

For example, the following IF statement checks if the order is completed (i.e. there is a value in column C) or not. To test if a cell is not blank, you use the "not equal to" operator (<>) in combination with an empty string (""). As the result, if cell C2 is not empty, the formula returns "Yes", otherwise "No":

AND & OR

These are the two most popular logical functions to check multiple criteria. The difference is how they do this:

- AND returns TRUE if **all conditions** are met, FALSE otherwise.
- OR returns TRUE if **any condition** is met, FALSE otherwise.

While rarely used on their own, these functions come in very handy as part of bigger formulas.

For example, to check the test results in columns B and C and return "Pass" if both are greater than 60, "Fail" otherwise, use the following IF formula with an embedded AND statement:

```
=IF(AND(B2>60, B2>60), "Pass", "Fail")
```

If it's sufficient to have just one test score greater than 60 (either test 1 or test 2), embed the OR statement:

```
=IF(OR(B2>60, B2>60), "Pass", "Fail")
```

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