

How do I calculate the Mean and Standard Deviation in Excel?

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Analyzing quantitative data effectively requires understanding core statistical measures. Among the most fundamental metrics for summarizing a dataset are the **mean** (a measure of central tendency) and the **standard deviation** (a measure of dispersion). These two values provide crucial insights into the typical value within the data and how much variability exists around that central point.

Fortunately, calculating these statistical indicators within Excel is straightforward, utilizing built-in functions designed specifically for speed and accuracy. This guide will walk you through the process, detailing the necessary functions and providing examples for both single and multiple data ranges.

By the end of this tutorial, you will be proficient in using the **AVERAGE** and **STDEV.S** functions, enabling you to quickly characterize any numerical dataset you encounter in your professional or academic work.

Understanding the Mean in Statistical Analysis

The mean, often referred to simply as the average, is the arithmetic center of a numerical collection of values. It is calculated by summing all the observations in the dataset and dividing that sum by the total number of observations. Statistically, the mean is vital because it represents the expected value or typical outcome if one were to randomly select an observation from the data distribution.

In Excel, the calculation of the mean is handled exclusively by the **AVERAGE function**. This function simplifies the manual arithmetic, allowing users to select a range of cells and instantly receive the result. The syntax is highly intuitive: `=AVERAGE(Range)`, where *Range* is the contiguous set of cells containing your numerical data.

While the mean is an excellent measure of central tendency, it is susceptible to being skewed by outliers or extreme values within the data. Therefore, it is rarely used in isolation. To fully comprehend the nature of the data, the mean must be paired with a measure of how spread out the data points are--which brings us to the concept of standard deviation.

Understanding Standard Deviation and Variability

The **standard deviation** (SD) is perhaps the most common and robust measure of statistical dispersion. It quantifies the amount of variation or dispersion of a set of values. A low standard deviation indicates that the data points tend to be very close to the mean, while a high standard deviation indicates that the data points are spread out over a wider range of values.

Conceptually, the standard deviation is the square root of the variance, and it is expressed in the same units as the original data, making it highly interpretable. For instance, if the mean height of a

group is 170 cm and the standard deviation is 5 cm, we know that most individuals fall within 5 cm of the average height.

Understanding the standard deviation is critical for making informed judgments about data reliability. If a dataset exhibits a small SD, we can assume the data is relatively consistent and reliable. Conversely, a large SD suggests high volatility or wide distribution, potentially alerting analysts to a multimodal distribution or significant data heterogeneity.

Choosing the Right Excel Function: Sample vs. Population

A critical nuance when calculating **standard deviation** in Excel involves distinguishing between whether your data represents an entire population or merely a statistical sample of that population. This distinction dictates which specific function you must use, as the underlying mathematical formulas--specifically the degrees of freedom used in the denominator--are different.

Technical Note on STDEV Functions

The original, deprecated **STDEV()** function, along with the modern **STDEV.S()** function, calculate the *sample* standard deviation. When working with statistics, we are almost always dealing with a sample extracted from a larger group, making **STDEV.S()** the default and preferred choice for general analysis.

If, however, your data set truly contains every single member of the group you are studying (i.e., it is the entire *population*), then you must use the **STDEV.P()** function to calculate the population standard deviation. Using the incorrect function introduces a slight but statistically significant error, especially in smaller data sets.

In the vast majority of practical Excel applications, analysts are working with sample data, which is why **STDEV.S()** is generally recommended for calculating data variability.

For consistency and best practice, Microsoft now recommends using the suffix-based functions. Avoid the older **STDEV()** function entirely, as it exists primarily for backward compatibility. Always opt for **STDEV.S()** for samples and **STDEV.P()** for populations.

Step-by-Step Guide: Calculating Mean and Standard Deviation

To begin the calculation process in Excel, you must first ensure your numerical data is correctly entered into contiguous cells within a single column or row. For this demonstration, we will assume the data is placed in Column B, starting at row 2 (B2) and ending at row 21 (B21).

Data Entry Prerequisite

Open your spreadsheet in **Excel**.

Input the numerical observations you wish to analyze into a single column (e.g., B2:B21).

Select an empty cell where you wish the result of the calculation to appear. For organizational clarity, it is often best to place these calculations immediately below the data column or in a dedicated summary table.

Calculating the Mean using the AVERAGE function

The AVERAGE function is the tool for calculating the arithmetic mean. In your selected output cell, type the following formula, replacing `B2:B21` with your specific data range:

```
=AVERAGE(B2:B21)
```

Press **Enter**. Excel will instantly calculate the sum of all values in the specified range and divide it by the count of those values, displaying the central tendency of your data.

Calculating the Standard Deviation using the STDEV.S function

Assuming you are working with a sample of data--which, as discussed, is the most common scenario--you will use the **STDEV.S** function. In the next empty output cell, enter this formula, adjusting the range as necessary:

```
=STDEV.S(B2:B21)
```

This formula applies the appropriate calculation for sample standard deviation. If you were certain your data represented the entire population, you would substitute `STDEV.S` with `STDEV.P` instead. The resulting value immediately tells you the degree of dispersion around the previously calculated mean.

Example 1: Analyzing a Single Dataset

Consider a scenario where a researcher has collected 20 observations related to reaction times in milliseconds. This single column of data must be summarized using the two key metrics--mean and standard deviation--to determine both the typical reaction time and the consistency of the results.

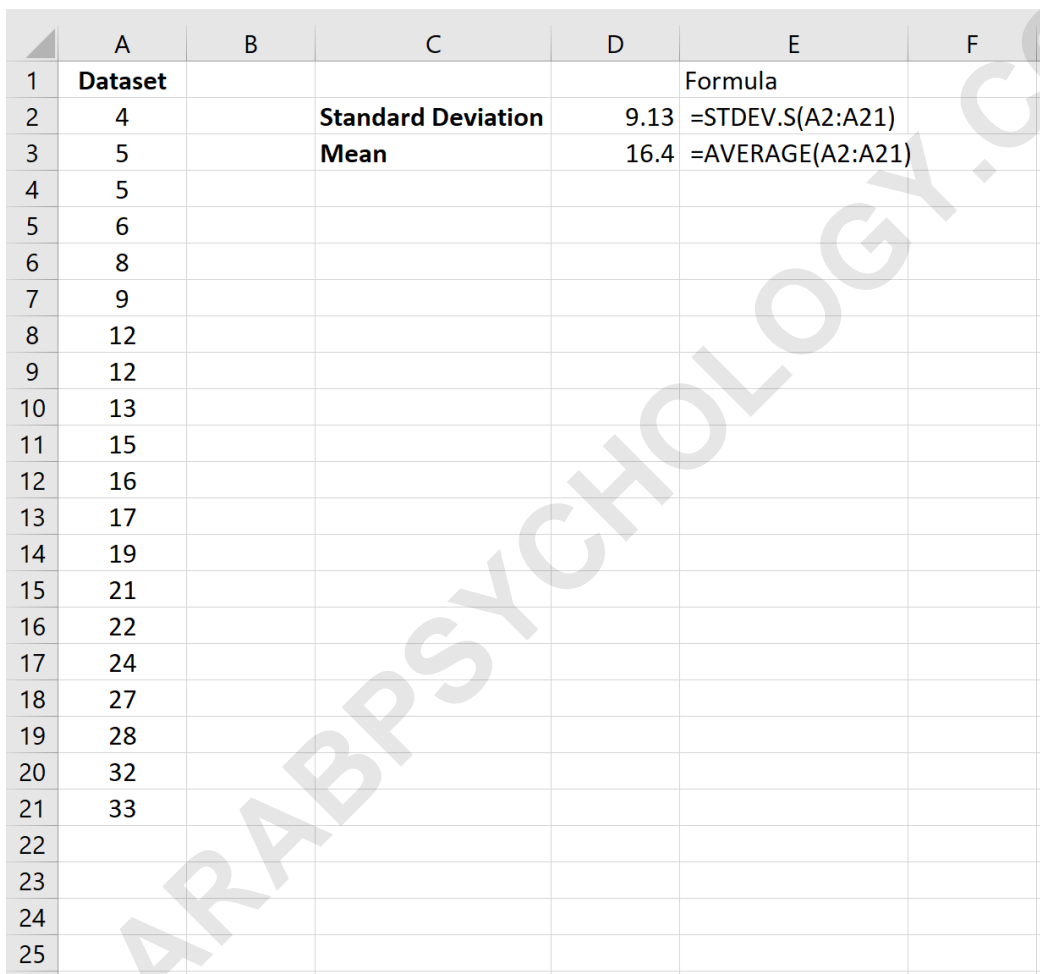
To execute this analysis, we enter the data into Column B (cells B2 through B21). We then designate cells D2 and D3 for the Mean and Standard Deviation results, respectively. The following

formulas are applied:

In cell D2 (Mean): `=AVERAGE (B2 : B21)`

In cell D3 (Standard Deviation): `=STDEV . S (B2 : B21)`

The screenshot below illustrates the setup and the resultant calculations within the Excel interface. Notice how the formulas clearly reference the entire range of data points, ensuring all observations contribute equally to the final statistical summary.



The screenshot shows an Excel spreadsheet with the following data:

	A	B	C	D	E	F
1	Dataset				Formula	
2	4		Standard Deviation	9.13	<code>=STDEV.S(A2:A21)</code>	
3	5		Mean	16.4	<code>=AVERAGE(A2:A21)</code>	
4	5					
5	6					
6	8					
7	9					
8	12					
9	12					
10	13					
11	15					
12	16					
13	17					
14	19					
15	21					
16	22					
17	24					
18	27					
19	28					
20	32					
21	33					
22						
23						
24						
25						

Upon execution, the calculation reveals that the average reaction time (Mean) is **16.4** milliseconds, while the variability (Standard Deviation) is **9.13** milliseconds. This suggests that while 16.4 is the center point, the individual reaction times vary quite significantly around this average.

Example 2: Working with Multiple Datasets

Often, statistical analysis involves comparing metrics across different groups or conditions. For instance, you might have data comparing the performance of two different teams, represented in

Column B and Column C, respectively. Calculating the mean and standard deviation for each group independently allows for a direct comparative assessment of their central tendencies and variances.

Suppose our spreadsheet contains two separate sets of scores: Data Set 1 in Column B and Data Set 2 in Column C. Both sets run from row 2 down to row 21:

	A	B	C	D	E
1		Dataset 1	Dataset 2	Dataset 3	
2		4	7	1	
3		5	7	3	
4		5	8	3	
5		6	8	4	
6		8	9	6	
7		9	11	8	
8		12	12	12	
9		12	12	14	
10		13	13	16	
11		15	14	17	
12		16	14	20	
13		17	15	21	
14		19	16	24	
15		21	16	26	
16		22	17	29	
17		24	19	32	
18		27	21	35	
19		28	22	39	
20		32	22	42	
21		33	23	45	
22					
23					
24					

To efficiently calculate the statistics for Data Set 1 (Column B), we use the following precise formulas in our designated summary cells:

Mean (Data Set 1): =AVERAGE (B2 : B21)

Standard Deviation (Data Set 1): =STDEV . S (B2 : B21)

The results for Data Set 1 are displayed in the following figure, showing the calculated values based on the column B range:

	A	B	C	D
1		Dataset 1	Dataset 2	Dataset 3
2		4	7	1
3		5	7	3
4		5	8	3
5		6	8	4
6		8	9	6
7		9	11	8
8		12	12	12
9		12	12	14
10		13	13	16
11		15	14	17
12		16	14	20
13		17	15	21
14		19	16	24
15		21	16	26
16		22	17	29
17		24	19	32
18		27	21	35
19		28	22	39
20		32	22	42
21		33	23	45
22	Standard Deviation	9.13		
23	Mean	16.4		
24				
25				
26				
27				

The true power of Excel lies in its ability to handle repeated calculations rapidly. Once the formulas are entered for Data Set 1, they can be easily copied (dragged) across to the corresponding columns for Data Set 2 (Column C). Excel automatically adjusts the cell references (e.g., changing B2:B21 to C2:C21), enabling rapid analysis of all comparative groups.

After copying the formulas, the summary table for both datasets is complete. This side-by-side comparison is essential for making statistical inferences, such as determining if the difference between the two means is statistically significant or if one data set is inherently more consistent than the other (indicated by a smaller standard deviation).

	A	B	C	D	E
1		Dataset 1	Dataset 2	Dataset 3	
2		4	7	1	
3		5	7	3	
4		5	8	3	
5		6	8	4	
6		8	9	6	
7		9	11	8	
8		12	12	12	
9		12	12	14	
10		13	13	16	
11		15	14	17	
12		16	14	20	
13		17	15	21	
14		19	16	24	
15		21	16	26	
16		22	17	29	
17		24	19	32	
18		27	21	35	
19		28	22	39	
20		32	22	42	
21		33	23	45	
22	Standard Deviation	9.13	5.19	13.83	
23	Mean	16.4	14.3	19.85	
24					
25					
26					
27					

Advanced Considerations for Statistical Integrity

While the **AVERAGE function** and the various STDEV functions handle most basic needs, rigorous statistical analysis requires attention to data quality and function appropriateness. Understanding how these functions handle non-numerical data and blank cells is crucial for maintaining integrity in your summary statistics.

It is important to note that the **AVERAGE function** and the STDEV functions in Excel are designed to ignore text values and logical values (like TRUE or FALSE) within the specified range. They only process cells containing numerical values. However, they treat cells containing the value zero (0) as valid numerical data, which is correct mathematically but might influence your mean if those zeros represent missing data rather than actual measured zero values.

If you encounter blank cells, the **AVERAGE** function ignores them, effectively calculating the mean based only on the count of non-empty numerical cells. If you need to include blank cells as zero values for specific statistical methodologies, you must manually convert those blanks to zeros.

before running the calculation. Alternatively, if your data contains errors (e.g., #DIV/0!), the statistical functions will typically return an error themselves, necessitating data cleansing prior to analysis.

For large-scale data manipulation where robust error handling is required, advanced users may consider nested functions or array formulas, such as combining `AGGREGATE` with `IF` statements, though this moves beyond the scope of simple mean and standard deviation calculation. For everyday use, utilizing **AVERAGE** and **STDEV.S** ensures quick, accurate, and easily reproducible summary statistics.

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