

How to Calculate 2 Standard Deviations in Google Sheets Easily

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Calculating Two Standard Deviations in Google Sheets: A Comprehensive Guide

Understanding Standard Deviation and its Role

The concept of Standard Deviation (SD) is foundational in statistics, serving as a powerful measure of the dispersion or spread of a dataset. Essentially, it quantifies the amount of variation or deviation of a set of values from the mean (average). 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. When analyzing data using tools like Google Sheets, calculating the standard deviation is the crucial first step toward understanding the underlying structure and variability within your measurements.

Calculating two standard deviations is particularly useful because this specific multiple helps define a statistically significant range around the mean. This range is often used to establish acceptable limits in quality control, analyze risk in finance, or identify abnormal observations in research data. By multiplying the calculated standard deviation by two, you establish boundary values that delineate what is considered typical versus what is considered unusually high or low for that specific distribution. This boundary provides a clear metric for subsequent statistical analysis and decision-making regarding the dataset.

In a practical context, mastering this calculation in a flexible environment like Google Sheets allows analysts to quickly perform complex statistical analyses without relying on specialized software. Google Sheets offers built-in functions designed specifically for this purpose, simplifying the process immensely. However, it is essential to select the correct function, often ``STDEV.S`` for sample data or ``STDEV.P`` for population data, to ensure the resulting calculation of two standard deviations is statistically sound and accurately reflects the nature of the data being examined.

The Significance of Two Standard Deviations: Introducing the Empirical Rule

The primary reason statisticians focus intently on the range defined by two standard deviations lies in the Empirical Rule, also known as the 68-95-99.7 rule. This rule is highly applicable to datasets that follow a bell-shaped curve, or Normal Distribution. The rule states that for a dataset conforming to a normal distribution, approximately 68% of all data values will fall within one standard deviation of the mean, 95% will fall within two standard deviations of the mean, and 99.7% will fall within three standard deviations of the mean.

The 95% threshold is extremely important in statistical inference and hypothesis testing. When a data point falls outside the range defined by plus or minus two standard deviations, there is only

about a 5% chance that this observation occurred naturally due to random variation, assuming the dataset is normally distributed. This low probability allows analysts to flag such values as statistically significant, potentially indicating a special cause variation, a measurement error, or an actual Outlier. Understanding this principle is fundamental to interpreting the results generated in Google Sheets.

By calculating the boundaries corresponding to two standard deviations below and above the mean, you are essentially defining the central 95% confidence interval for your data. This interval sets the expectation for typical behavior within the measured process or population. Any observation that falls outside this interval warrants closer inspection because it deviates significantly from the average performance. This framework provides a robust method for analyzing data reliability and stability, whether you are monitoring stock returns, manufacturing tolerances, or research outcomes.

Choosing the Right Function: STDEV.S vs. STDEV.P

Before implementing the calculation in Google Sheets, it is critical to determine whether your data represents a complete population or merely a sample drawn from a larger population. This distinction dictates which standard deviation function should be employed. Google Sheets offers two main functions for calculating the Standard Deviation: `STDEV.S` (or the older `STDEV`) calculates the standard deviation based on a sample, while `STDEV.P` calculates the standard deviation based on the entire population.

In most real-world scenarios, particularly in business or research, you are usually working with a sample of data rather than the entire population (which might be infinite or simply too large to measure). When using a sample, the formula must apply a correction (Bessel's correction) to provide an unbiased estimate of the population standard deviation. The `STDEV.S` function in Google Sheets incorporates this correction. If you use the older, generalized `STDEV` function, Google Sheets typically defaults to calculating the sample standard deviation, but `STDEV.S` is the modern and clearer choice for sample data.

Conversely, if your dataset genuinely includes every single member of the group you are interested in--for instance, the test scores of every student in a single class, where the class itself is the defined population--then you should use the `STDEV.P` function. Using the wrong function will introduce a slight, but potentially significant, error into your calculation of the two standard deviation range. Since the application of the Empirical Rule relies on accurate statistical parameters, selecting the appropriate function is a fundamental requirement for valid analysis.

Core Formula Implementation in Google Sheets

Calculating the value of two standard deviations is a straightforward multiplicative process once the

core standard deviation is determined. The formula must first call the appropriate standard deviation function, specifying the range of data cells, and then multiply the result by the factor of two. This single-line formula simplifies complex statistical measurement into an easily executable command within the spreadsheet environment of [Google Sheets](#).

To calculate the value representing two standard deviations for a range of cells, say A2 through A14, you would utilize the following structure. Note that we use the generic `STDEV` here, which usually maps to `STDEV.S` for sample data calculation in modern spreadsheet applications, ensuring a robust estimation of the population variation based on the available data sample.

=2*STDEV(A2:A14)

This particular example calculates the magnitude of two standard deviations for the numerical values contained within the specified cell range **A2:A14**. It is essential to ensure that the specified range contains only numerical data; if text or blank cells are included, the standard deviation function may ignore them or return an error, leading to an inaccurate calculation. The resulting number from this formula is the distance that two standard deviations represents, not the actual boundary values themselves. To find the boundaries, this result must then be added to and subtracted from the calculated mean of the dataset.

Step-by-Step Practical Example Setup

To illustrate the practical application of calculating two standard deviations, consider a dataset representing the daily production output (in units) from a manufacturing line over 13 days. We aim to identify the normal operating range (the 95% confidence interval) and detect any days where output might be considered an [Outlier](#). We will assume this data is a representative sample of the line's overall performance and that the underlying process approximates a [Normal Distribution](#).

Suppose we have the following dataset entered into column A of our Google Sheet, starting in cell A2 and ending in A14:

	A	B	C	D
1	Data			
2	68			
3	70			
4	71			
5	74			
6	77			
7	78			
8	80			
9	81			
10	82			
11	84			
12	89			
13	90			
14	91			
15				
16				
17				
18				
19				

The goal is to determine the mean output, the value of two standard deviations, and then establish the upper and lower control limits. These limits will define the range within which 95% of future production outputs are expected to fall, based on the statistical properties defined by the Empirical Rule. We will use column D to calculate these key statistical metrics sequentially, ensuring clarity and traceability in our analysis.

We will strategically place the formulas in cells D1 through D4 to calculate the required metrics. This structured approach allows us to reference the output of preceding calculations (like the mean and the two standard deviation value) in subsequent formulas, which is essential for determining the upper and lower boundary limits efficiently. This systematic setup streamlines the overall statistical analysis within Google Sheets, preparing the data for clear interpretation.

Calculating Descriptive Statistics (Mean and SD)

To accurately establish the boundaries of two standard deviations, we must first calculate the arithmetic mean of the dataset. The mean provides the central point around which the data is distributed. In Google Sheets, this is accomplished using the `AVERAGE` function, applied to the data range A2:A14. Once the mean is established in cell D1, we proceed to calculate the specific value of two standard deviations using the `STDEV` function in cell D2.

The subsequent steps involve combining these calculated values to find the actual threshold points that define the 95% acceptance window. The lower boundary (LCL) is found by subtracting the two standard deviation value from the mean, and the upper boundary (UCL) is found by adding the two standard deviation value to the mean. These calculations are performed sequentially using cell references to maintain dynamic linkage, meaning if the data in column A changes, all calculated statistics update automatically.

We can use the following formulas in various cells to calculate the mean, the value of two standard deviations, and the values that fall two standard deviations below and above the mean:

D1: **=AVERAGE(A2:A14)** (Calculates the central tendency or mean of the production output.)

D2: **=2*STDEV(A2:A14)** (Calculates the magnitude of two Standard Deviation units.)

D3: **=D1-D2** (Determines the Lower Control Limit: Mean minus two standard deviations.)

D4: **=D1+D2** (Determines the Upper Control Limit: Mean plus two standard deviations.)

The following screenshot demonstrates the implementation of these formulas and the resulting values in column D:

D2 fx =2*STDEV(A2:A14)

	A	B	C	D
1	Data		Mean	79.61538462
2	68		2 Std Dev	15.22144237
3	70		Mean - 2 Std Dev	64.39394225
4	71		Mean + 2 Std Dev	94.83682698
5	74			
6	77			
7	78			
8	80			
9	81			
10	82			
11	84			
12	89			
13	90			
14	91			
15				
16				
17				
18				

Interpreting the Results and Identifying Outliers

Upon successful execution of the formulas in Google Sheets, we obtain definitive numerical results

for our descriptive statistics and control boundaries. These values provide an empirical basis for assessing the data's distribution and stability. Analyzing the output derived from the calculation is the most critical step, as it translates raw numbers into actionable statistical insight.

From the output we can see the following summarized statistical values:

The mean value of the dataset is **79.615**. This is the expected average daily output.

The value of two standard deviations is **15.221**. This is the statistical distance from the mean that encompasses 95% of expected variation.

The value that falls two standard deviations below the mean (LCL) is **64.394**.

The value that falls two standard deviations above the mean (UCL) is **94.837**.

Assuming that this sample data is drawn from a larger population following a Normal Distribution, we can statistically conclude that 95% of all daily production output values in this population are expected to fall between **64.394** and **94.837**. Any observed daily output falling outside this range is a strong candidate for being an Outlier. Outliers must be investigated as they may signal unusual circumstances, such as equipment malfunction, operator error, or a significant process improvement.

Extension: Calculating Three Standard Deviations

While two standard deviations define the 95% interval, some applications--especially those demanding extremely high precision, such as high-reliability engineering or Six Sigma quality initiatives--require an even tighter definition of normality. This is where the range defined by three standard deviations becomes relevant. According to the Empirical Rule, three standard deviations encompass approximately 99.7% of all data points in a normally distributed dataset.

The process for calculating three standard deviations in Google Sheets is identical to the calculation for two, requiring only a minor adjustment to the multiplicative factor. This change allows analysts to quickly shift from a 95% confidence threshold to a 99.7% threshold, providing a much stricter boundary for identifying statistically unusual events.

Note: If you would instead like to calculate three standard deviations, simply replace the **2** in the formula in cell **D2** with a **3**. The revised formula in cell D2 would thus be: **=3*STDEV(A2:A14)**. Recalculating the boundaries (D3 and D4) using this new value will result in a wider interval, reflecting the much smaller probability (0.3%) of values falling outside that range in a Normal Distribution. This rigor is critical for identifying rare, high-impact events.