

Calculate Skewness & Kurtosis in Google Sheets

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November 7, 2025

RECOMMENDED CITATION

Mohammed loot (2025). *Calculate Skewness & Kurtosis in Google Sheets*. PSYCHOLOGICAL STATISTICS. Retrieved from <https://statistics.arabpsychology.com/?p=12130>

In the field of [statistics](#), understanding the inherent shape of data is crucial for accurate analysis. Two fundamental measures used to quantify the form of a probability distribution are [skewness](#) and [kurtosis](#). Together, these metrics provide essential insights beyond central tendency (mean, median, mode) and variability.

This comprehensive tutorial will explain the theoretical foundations of these measures and provide a practical, step-by-step guide on how to calculate both the **skewness** and **kurtosis** of any given dataset directly within the powerful environment of [Google Sheets](#).

Understanding Distribution Shape: Skewness and Kurtosis Defined

The first key measure, [skewness](#), provides a quantitative assessment of the asymmetry observed in a data distribution. It determines whether the data points are distributed evenly around the mean or if they cluster heavily to one side, pulling the distribution's "tail" in the opposite direction. The resulting value--which can be positive, negative, or zero--is a primary indicator of non-normality.

A distribution is considered perfectly symmetrical if its **skewness** value is zero, such as in the case of a perfect bell curve. However, real-world data rarely achieves perfect symmetry, making the calculation of this metric essential for model selection and interpretation in advanced statistical methods.

In contrast, [kurtosis](#) focuses on the extremities of the distribution--specifically, the weight of the tails relative to the center. It measures whether the data are heavy-tailed (meaning more outliers than expected) or light-tailed (fewer outliers than expected) when compared against the benchmark distribution: the [normal distribution](#).

Diving Deeper into Skewness: Asymmetry Explained

Understanding the sign of the **skewness** value is critical for interpreting the shape of your dataset. The direction of the skew indicates where the majority of the data is concentrated and which direction the long tail extends.

Negative Skew (Left-Skewed): This occurs when the majority of the data is concentrated on the right side of the distribution. The longer tail extends towards the left, indicating that the mean is typically less than the median. These distributions are sometimes observed in data sets where a ceiling effect or upper bound limits high values.

Positive Skew (Right-Skewed): This indicates that the bulk of the observations lie on the left side. The long, thinner tail extends towards the right, suggesting that the mean is greater than the median. Examples include income distribution or test scores where most people perform moderately well but a few achieve very high scores.

Zero Skew (Symmetrical): A value approaching zero suggests the distribution is highly

symmetrical. In this ideal scenario, the mean, median, and mode are often equal or very close, confirming that the data is balanced around its central point.

It is important to note that **skewness** is sensitive to outliers. A single extreme value can significantly distort the calculated value, making visual inspection of a histogram or box plot a necessary companion to the numerical calculation.

The Role of Kurtosis: Tails and Outliers

While **skewness** deals with lateral symmetry, **kurtosis** addresses the vertical shape--specifically the peakedness and, more importantly, the thickness of the distribution's tails. The standard reference point for **kurtosis** is the benchmark **normal distribution**.

In classical definitions (Pearson's measure), the kurtosis of a normal distribution is precisely 3. This value is often used as the standard baseline, leading to the alternative measure known as excess kurtosis (Kurtosis - 3). Google Sheets, like many software packages, calculates excess kurtosis directly, meaning a result of 0 indicates a normal distribution.

Mesokurtic: A distribution with an excess **kurtosis** equal to zero (classical kurtosis = 3). This distribution matches the tail characteristics of the **normal distribution**, serving as the neutral reference point for comparison.

Platykurtic: If the excess kurtosis is negative (less than 0), the distribution is said to be *platykurtic*. These distributions are characterized by thinner tails and a flatter peak than the normal distribution, implying that they produce fewer and less extreme outliers. The variance is more evenly distributed across the distribution's range.

Leptokurtic: If the excess kurtosis is positive (greater than 0), the distribution is said to be *leptokurtic*. These possess fatter, heavier tails and a sharper, taller peak than the normal distribution. This indicates a higher probability of extreme values or outliers, suggesting that risk assessment might need adjustment for the volatility implied by the tail weight.

Prerequisites and Dataset Setup in Google Sheets

Calculating these crucial shape metrics is straightforward using the built-in functions available in [Google Sheets](#). Before diving into the formulas, we must ensure our data is properly organized. For demonstration purposes, consider a sample dataset representing 20 observations, perhaps daily stock returns or student test scores.

Suppose we have entered the following numerical dataset into Column B of our sheet, spanning rows 2 through 21. This array of values will serve as the input range for both statistical calculations.

	A	B	C	D
1	Data Values			
2	88			
3	85			
4	82			
5	97			
6	67			
7	77			
8	74			
9	86			
10	81			
11	95			
12	77			
13	88			
14	85			
15	76			
16	81			
17	82			
18	82			
19	84			
20	90			
21	91			
22				
23				
24				

It is vital to confirm that the data range contains only numerical entries. While Google Sheets functions are robust, non-numerical text or missing values (blanks) can sometimes affect the precise calculation of these distribution parameters, depending on the specific function implementation.

Step-by-Step Guide: Calculating Skewness and Kurtosis

Google Sheets provides two highly specific functions designed for calculating these distribution characteristics across a given range of cells. These functions automatically handle the complex calculations involved in estimating the third and fourth standardized moments of the sample data.

The functions are incredibly easy to implement, requiring only the array of values as the input argument. The syntax for each function is as follows:

To calculate **Skewness**: Use the **SKEW(Array of values)** function. This will return the sample [skewness](#) value, which measures the distribution's asymmetry relative to the mean.

To calculate **Kurtosis**: Use the **KURT(Array of values)** function. This specifically returns the

excess **kurtosis**, which is the measure of tail weight relative to the normal distribution (N.D. excess kurtosis is 0).

To apply these to our example dataset (B2:B21), we would simply enter the corresponding formulas into empty cells, such as C2 and C3. For instance, in C2, we input `=SKEW(B2:B21)` and in C3, we input `=KURT(B2:B21)`. The resulting setup is illustrated below:

	A	B	C	D	E
1	Data Values				Formula
2	88		Skewness	-0.18490	=SKEW(A2:A21)
3	85		Kurtosis	0.34624	=KURT(A2:A21)
4	82				
5	97				
6	67				
7	77				
8	74				
9	86				
10	81				
11	95				
12	77				
13	88				
14	85				
15	76				
16	81				
17	82				
18	82				
19	84				
20	90				
21	91				
22					
23					
24					

Interpreting Calculation Results and Error Handling

Upon executing the functions on the provided dataset, Google Sheets yields the following numerical results: The calculated skewness turns out to be **-0.18490** and the kurtosis turns out to be **0.34624**.

Since the **skewness** value is slightly negative (close to zero), we can conclude that the distribution is nearly symmetrical but exhibits a very minor negative skew, suggesting a slightly longer tail extending to the left. The positive excess **kurtosis** (0.34624) classifies the distribution as *leptokurtic*, indicating slightly heavier tails than the reference normal distribution.

When working with these functions, users must be aware of potential errors. Either the **SKEW()** or **KURT()** function will return the error **#DIV/0!** if the underlying calculation cannot be completed due to insufficient data or lack of variance, as detailed below:

Insufficient Data Points: If the input array contains fewer than three numerical data points. Both [skewness](#) and [kurtosis](#) calculations rely on third and fourth moments, respectively, which require a minimum amount of variance and data depth to be meaningful.

Zero Variance: If all the values in the dataset are identical (i.e., if the [sample standard deviation](#) is zero). In this scenario, the denominator used in the standardized moment calculation becomes zero, resulting in the division-by-zero error.

Summary of Statistical Shape Analysis

The ability to calculate and interpret **skewness** and **kurtosis** is foundational for advanced statistical modeling, particularly in finance and risk management where understanding tail behavior is paramount. By using the efficient built-in functions in [Google Sheets](#), practitioners can quickly assess the shape of their data distributions without relying on external statistical software.

Remember that a distribution is deemed truly normal only if its **skewness** is close to zero and its excess **kurtosis** is also close to zero. Any significant departure from these values suggests that non-parametric methods or transformations might be required before applying techniques that assume normality.

Additional Resource: Skewness & Kurtosis Calculator

For users interested in cross-validating their calculations or exploring immediate results for smaller datasets, the following external tool provides a convenient online alternative for computing these vital statistical measures.

[Statology Skewness and Kurtosis Calculator](#)