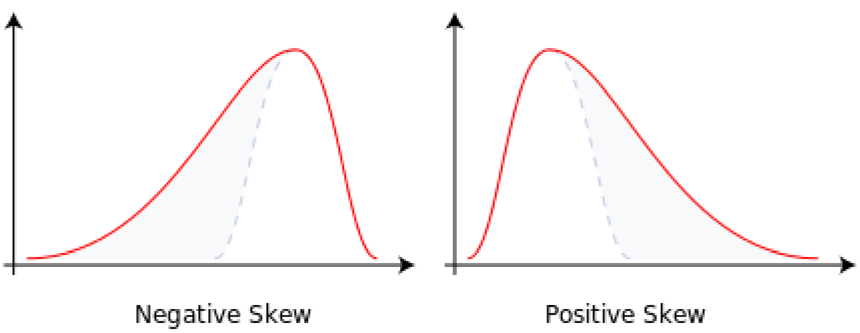
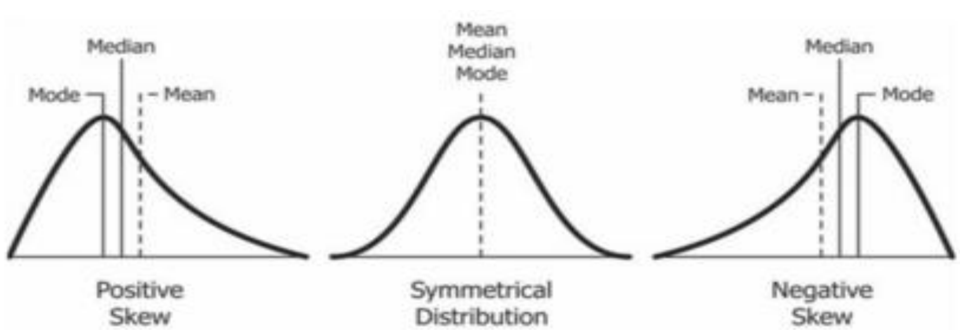
Skewness:

In probability theory and statistics, **skewness** is a measure of the asymmetry of the probability distribution of a real-valued random variable about its mean. The skewness value can be positive or negative, or undefined. For a unimodal distribution, negative skew commonly indicates that the *tail* is on the left side of the distribution, and positive skew indicates that the tail is on the right. In cases where one tail is long but the other tail is fat, skewness does not obey a simple rule. For example, a zero value means that the tails on both sides of the mean balance out overall; this is the case for a symmetric distribution, but can also be true for an asymmetric distribution where one tail is long and thin, and the other is short but fat.

Consider the two distributions in the figure just below. Within each graph, the values on the right side of the distribution taper differently from the values on the left side. These tapering sides are called *tails*, and they provide a visual means to determine which of the two kinds of skewness a distribution has:

1. *Negative skew*: The left tail is longer; the mass of the distribution is concentrated on the right of the figure. The distribution is said to be *left-skewed*, *left-tailed*, or *skewed to the left*, despite the fact that the curve itself appears to be skewed or leaning to the right; *left* instead refers to the left tail being drawn out and, often, the mean being skewed to the left of a typical center of the data. A left-skewed distribution usually appears as a *right-leaning* curve.[1]
2. *Positive skew*: The right tail is longer; the mass of the distribution is concentrated on the left of the figure. The distribution is said to be *right-skewed*, *right-tailed*, or *skewed to the right*, despite the fact that the curve itself appears to be skewed or leaning to the left; *right* instead refers to the right tail being drawn out and, often, the mean being skewed to the right of a typical center of the data. A right-skewed distribution usually appears as a *left-leaning* curve.[1]





Skewness is a descriptive statistic that can be used in conjunction with the histogram and the normal quantile plot to characterize the data or distribution.

Skewness indicates the direction and relative magnitude of a distribution's deviation from the normal distribution.

Kurtosis

In probability theory and statistics, **kurtosis** is a measure of the "tailedness" of the probability distribution of a real-valued random variable. Like skewness, kurtosis describes the shape of a probability distribution and, like skewness, there are different ways of quantifying it for a theoretical distribution and corresponding ways of estimating it from a sample from a population. Different measures of kurtosis may have different interpretations.

The standard measure of a distribution's kurtosis, originating with Karl Pearson,[1] is a scaled version of the fourth moment of the distribution. This number is related to the tails of the distribution, not its peak hence, the sometimes-seen characterization of kurtosis as "peakedness" is incorrect. For this measure, higher kurtosis corresponds to greater extremity of deviations (or outliers), and not the configuration of data near the mean.

The kurtosis of any univariate normal distribution is 3. It is common to compare the kurtosis of a distribution to this value. Distributions with kurtosis less than 3 are said to be *platykurtic*, although this does not imply the distribution is "flat-topped" as is sometimes stated. Rather, it means the distribution produces fewer and less extreme outliers than does the normal distribution. An example of a platykurtic distribution is the uniform distribution, which does not produce outliers. Distributions with kurtosis greater than 3 are said to be *leptokurtic*. An example of a leptokurtic distribution is the Laplace distribution, which has tails that asymptotically approach zero more slowly than a Gaussian, and therefore produces more outliers than the normal distribution. It is also common practice to use an adjusted version of Pearson's kurtosis, the excess kurtosis, which is the kurtosis minus 3, to provide the comparison to the normal distribution. Some authors use "kurtosis" by itself to refer to the excess kurtosis. For clarity and generality, however, this article follows the non-excess convention and explicitly indicates where excess kurtosis is meant.

Alternative measures of kurtosis are: the L-kurtosis, which is a scaled version of the fourth L-moment; measures based on four population or sample quantiles.[3] These are analogous to the alternative measures of skewness that are not based on ordinary moments.[3]

Mesokurtic:

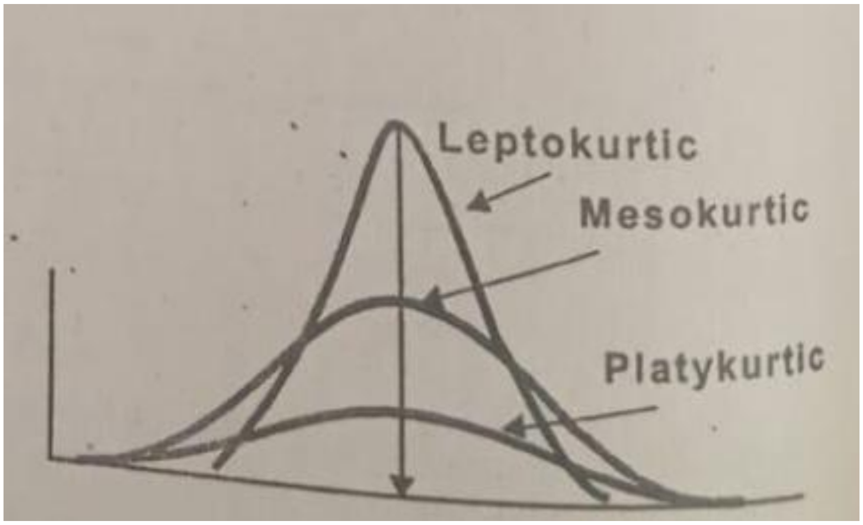
Distributions with zero excess kurtosis are called **mesokurtic**, or mesokurtotic. The most prominent example of a mesokurtic distribution is the normal distribution family, regardless of the values of its parameters. A few other well-known distributions can be mesokurtic, depending on parameter values: for example, the binomial distribution is mesokurtic

Leptokurtic:

A distribution with positive excess kurtosis is called **leptokurtic**, or leptokurtotic. "Lepto-" means "slender".[8] In terms of shape, a leptokurtic distribution has *fatter tails*

Platykurtic

A distribution with negative excess kurtosis is called **platykurtic**, or platykurtotic. "Platy-" means "broad".[10] In terms of shape, a platykurtic distribution has *thinner tails*.


Leptokurtic
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