

# Understanding Skewness

Data Science and A.I. Lecture Series

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## What is Skewness?

When mean and variance are the same in two different datasets, the distributions of the data could still be very different in terms of their shape, particularly with respect to their symmetry and the spread of data points around the central value. This is where skewness becomes crucial for further understanding the underlying distributions.

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## Frequency Distributions having Same Mean and Standard Deviation

Consider the following distributions:

Variable (X)	0-5	5-10	10-15	15-20	20-25	25-30
Frequency (Y)	10	30	60	30	10	0

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In both distributions, the mean is 15 and the standard deviation is 6.

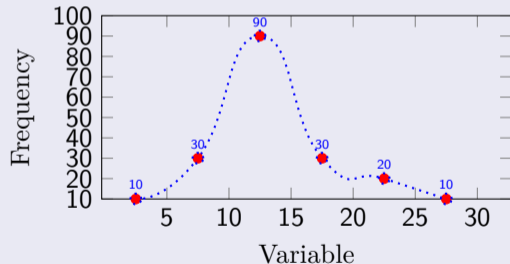
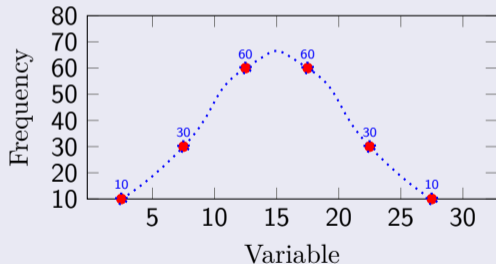
# Frequency Polygons

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Their shapes differ, as seen in the frequency polygons:

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The first distribution is symmetrical, while the second distribution is asymmetrical or skewed.

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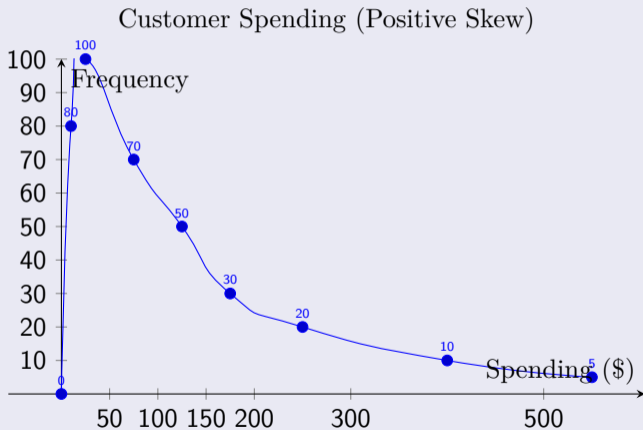
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- **Definition 3:** “When a series is not symmetrical it is said to be a asymmetrical or skewed.” — *Croxton & Cowden*

# Types of Skewness

## Positive or Right Skew

In a positively skewed distribution, the right tail is longer than the left tail. The majority of data values are concentrated on the left side of the distribution, while a few larger values stretch the distribution to the right.

**Example :** Most customers at a retail store make small purchases, but a few make very large purchases.



# Types of Skewness

## Negative of Left Skew

In a negatively skewed distribution, the left tail is longer or fatter than the right tail. The majority of data values are concentrated on the right side of the distribution, while a few smaller values stretch the distribution to the left.

**Example :** In a class, most students score very well on a relatively easy exam, but there are a few students who perform poorly. The distribution of scores will likely be negatively skewed because the low scores drag the average down.

Exam Scores (Negative Skew)

