# Measures of Variability

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## 1 Introduction

Measures of Variability, like central tendency, are important concepts in probability and statistics in math.

Some of these measures of variability are: the variance, standard deviation, and range.

## 2 Range

The range is one of the important Measures of Variability. The range is simple to calculate: it is the maximum number minus the minimum number.

**Example:** $1, 2, 3, 4, 5$

The range is:
$$5 - 1 = 4$$

## 3 Variance

The variance is a measure of how data points differ from the mean.

**Example:** $2, 4, 6, 8, 10$

The mean here is:
$$\frac{2 + 4 + 6 + 8 + 10}{5} = \frac{30}{5} = 6$$

The variance is calculated as:
$$\frac{(2-6)^2 + (4-6)^2 + (6-6)^2 + (8-6)^2 + (10-6)^2}{5} = \frac{16 + 4 + 0 + 4 + 16}{5} = \frac{40}{5} = 8$$

## 4 Standard Deviation

The standard deviation is the square root of the variance and provides a measure of the spread of data around the mean.

**Example:** $2, 4, 6, 8, 10$

The variance is 8 (as calculated previously).

The standard deviation is:
$$\sqrt{8} \approx 2.83$$

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