

$x_1, x_2, x_3, \dots, x_n$ 의 평균, 분산, 표준편차
(Mean, Variance, Standard Deviation of $x_1, x_2, x_3, \dots, x_n$)

Mean, Variance, Standard Deviation of $x_1, x_2, x_3, \dots, x_n$

▶ Start

$x_1, x_2, x_3, \dots, x_n$

Mean, Variance, Standard Deviation of $x_1, x_2, x_3, \dots, x_n$

▶ Start

$x_1, x_2, x_3, \dots, x_n$

Mean :

Mean, Variance, Standard Deviation of $x_1, x_2, x_3, \dots, x_n$

▶ Start

$x_1, x_2, x_3, \dots, x_n$

Mean : m

Mean, Variance, Standard Deviation of $x_1, x_2, x_3, \dots, x_n$

▶ Start

$x_1, x_2, x_3, \dots, x_n$

$$\text{Mean : } m = \frac{x_1 + x_2 + x_3 + \dots + x_n}{n}$$

Mean, Variance, Standard Deviation of $x_1, x_2, x_3, \dots, x_n$

▶ Start

$x_1, x_2, x_3, \dots, x_n$

$$\begin{aligned}\text{Mean : } m &= \frac{x_1 + x_2 + x_3 + \dots + x_n}{n} \\ &= \frac{1}{n} \sum_{i=1}^n x_i\end{aligned}$$

Mean, Variance, Standard Deviation of $x_1, x_2, x_3, \dots, x_n$

▶ Start

$x_1, x_2, x_3, \dots, x_n$

$$\begin{aligned}\text{Mean : } m &= \frac{x_1 + x_2 + x_3 + \dots + x_n}{n} \\ &= \frac{1}{n} \sum_{i=1}^n x_i\end{aligned}$$

Variance :

Mean, Variance, Standard Deviation of $x_1, x_2, x_3, \dots, x_n$

▶ Start

$x_1, x_2, x_3, \dots, x_n$

$$\begin{aligned}\text{Mean : } m &= \frac{x_1 + x_2 + x_3 + \dots + x_n}{n} \\ &= \frac{1}{n} \sum_{i=1}^n x_i\end{aligned}$$

Variance : σ^2

Mean, Variance, Standard Deviation of $x_1, x_2, x_3, \dots, x_n$

▶ Start

$x_1, x_2, x_3, \dots, x_n$

$$\begin{aligned}\text{Mean : } m &= \frac{x_1 + x_2 + x_3 + \dots + x_n}{n} \\ &= \frac{1}{n} \sum_{i=1}^n x_i\end{aligned}$$

$$\text{Variance : } \sigma^2 = \frac{(x_1 - m)^2 + (x_2 - m)^2 + \dots + (x_n - m)^2}{n}$$

Mean, Variance, Standard Deviation of $x_1, x_2, x_3, \dots, x_n$

▶ Start

$x_1, x_2, x_3, \dots, x_n$

$$\begin{aligned}\text{Mean : } m &= \frac{x_1 + x_2 + x_3 + \dots + x_n}{n} \\ &= \frac{1}{n} \sum_{i=1}^n x_i\end{aligned}$$

$$\begin{aligned}\text{Variance : } \sigma^2 &= \frac{(x_1 - m)^2 + (x_2 - m)^2 + \dots + (x_n - m)^2}{n} \\ &= \frac{1}{n} \sum_{i=1}^n (x_i - m)^2\end{aligned}$$

Mean, Variance, Standard Deviation of $x_1, x_2, x_3, \dots, x_n$

▶ Start

$x_1, x_2, x_3, \dots, x_n$

$$\begin{aligned}\text{Mean : } m &= \frac{x_1 + x_2 + x_3 + \dots + x_n}{n} \\ &= \frac{1}{n} \sum_{i=1}^n x_i\end{aligned}$$

$$\begin{aligned}\text{Variance : } \sigma^2 &= \frac{(x_1 - m)^2 + (x_2 - m)^2 + \dots + (x_n - m)^2}{n} \\ &= \frac{1}{n} \sum_{i=1}^n (x_i - m)^2 = \frac{1}{n} \sum_{i=1}^n (x_i^2 - 2mx_i + m^2)\end{aligned}$$

Mean, Variance, Standard Deviation of $x_1, x_2, x_3, \dots, x_n$

▶ Start

$x_1, x_2, x_3, \dots, x_n$

$$\begin{aligned}\text{Mean : } m &= \frac{x_1 + x_2 + x_3 + \dots + x_n}{n} \\ &= \frac{1}{n} \sum_{i=1}^n x_i\end{aligned}$$

$$\begin{aligned}\text{Variance : } \sigma^2 &= \frac{(x_1 - m)^2 + (x_2 - m)^2 + \dots + (x_n - m)^2}{n} \\ &= \frac{1}{n} \sum_{i=1}^n (x_i - m)^2 = \frac{1}{n} \sum_{i=1}^n (x_i^2 - 2mx_i + m^2) \\ &= \frac{1}{n} \sum_{i=1}^n x_i^2\end{aligned}$$

Mean, Variance, Standard Deviation of $x_1, x_2, x_3, \dots, x_n$

▶ Start

$x_1, x_2, x_3, \dots, x_n$

$$\begin{aligned}\text{Mean : } m &= \frac{x_1 + x_2 + x_3 + \dots + x_n}{n} \\ &= \frac{1}{n} \sum_{i=1}^n x_i\end{aligned}$$

$$\begin{aligned}\text{Variance : } \sigma^2 &= \frac{(x_1 - m)^2 + (x_2 - m)^2 + \dots + (x_n - m)^2}{n} \\ &= \frac{1}{n} \sum_{i=1}^n (x_i - m)^2 = \frac{1}{n} \sum_{i=1}^n (x_i^2 - 2mx_i + m^2) \\ &= \frac{1}{n} \sum_{i=1}^n x_i^2 - 2m\end{aligned}$$

Mean, Variance, Standard Deviation of $x_1, x_2, x_3, \dots, x_n$

▶ Start

$x_1, x_2, x_3, \dots, x_n$

$$\begin{aligned}\text{Mean : } m &= \frac{x_1 + x_2 + x_3 + \dots + x_n}{n} \\ &= \frac{1}{n} \sum_{i=1}^n x_i\end{aligned}$$

$$\begin{aligned}\text{Variance : } \sigma^2 &= \frac{(x_1 - m)^2 + (x_2 - m)^2 + \dots + (x_n - m)^2}{n} \\ &= \frac{1}{n} \sum_{i=1}^n (x_i - m)^2 = \frac{1}{n} \sum_{i=1}^n (x_i^2 - 2mx_i + m^2) \\ &= \frac{1}{n} \sum_{i=1}^n x_i^2 - 2m \times \frac{1}{n} \sum_{i=1}^n x_i\end{aligned}$$

Mean, Variance, Standard Deviation of $x_1, x_2, x_3, \dots, x_n$

▶ Start

$x_1, x_2, x_3, \dots, x_n$

$$\begin{aligned}\text{Mean : } m &= \frac{x_1 + x_2 + x_3 + \dots + x_n}{n} \\ &= \frac{1}{n} \sum_{i=1}^n x_i\end{aligned}$$

$$\begin{aligned}\text{Variance : } \sigma^2 &= \frac{(x_1 - m)^2 + (x_2 - m)^2 + \dots + (x_n - m)^2}{n} \\ &= \frac{1}{n} \sum_{i=1}^n (x_i - m)^2 = \frac{1}{n} \sum_{i=1}^n (x_i^2 - 2mx_i + m^2) \\ &= \frac{1}{n} \sum_{i=1}^n x_i^2 - 2m \times \frac{1}{n} \sum_{i=1}^n x_i + m^2\end{aligned}$$

Mean, Variance, Standard Deviation of $x_1, x_2, x_3, \dots, x_n$

▶ Start

$x_1, x_2, x_3, \dots, x_n$

$$\begin{aligned}\text{Mean : } m &= \frac{x_1 + x_2 + x_3 + \dots + x_n}{n} \\ &= \frac{1}{n} \sum_{i=1}^n x_i\end{aligned}$$

$$\begin{aligned}\text{Variance : } \sigma^2 &= \frac{(x_1 - m)^2 + (x_2 - m)^2 + \dots + (x_n - m)^2}{n} \\ &= \frac{1}{n} \sum_{i=1}^n (x_i - m)^2 = \frac{1}{n} \sum_{i=1}^n (x_i^2 - 2mx_i + m^2) \\ &= \frac{1}{n} \sum_{i=1}^n x_i^2 - 2m \times \frac{1}{n} \sum_{i=1}^n x_i + m^2 \times \frac{1}{n} \sum_{i=1}^n 1\end{aligned}$$

Mean, Variance, Standard Deviation of $x_1, x_2, x_3, \dots, x_n$

▶ Start

$x_1, x_2, x_3, \dots, x_n$

$$\begin{aligned}\text{Mean : } m &= \frac{x_1 + x_2 + x_3 + \dots + x_n}{n} \\ &= \frac{1}{n} \sum_{i=1}^n x_i\end{aligned}$$

$$\begin{aligned}\text{Variance : } \sigma^2 &= \frac{(x_1 - m)^2 + (x_2 - m)^2 + \dots + (x_n - m)^2}{n} \\ &= \frac{1}{n} \sum_{i=1}^n (x_i - m)^2 = \frac{1}{n} \sum_{i=1}^n (x_i^2 - 2mx_i + m^2) \\ &= \frac{1}{n} \sum_{i=1}^n x_i^2 - 2m \times \frac{1}{n} \sum_{i=1}^n x_i + m^2 \times \frac{1}{n} \sum_{i=1}^n 1 \\ &= \frac{1}{n} \sum_{i=1}^n x_i^2\end{aligned}$$

Mean, Variance, Standard Deviation of $x_1, x_2, x_3, \dots, x_n$

▶ Start

$x_1, x_2, x_3, \dots, x_n$

$$\begin{aligned}\text{Mean : } m &= \frac{x_1 + x_2 + x_3 + \dots + x_n}{n} \\ &= \frac{1}{n} \sum_{i=1}^n x_i\end{aligned}$$

$$\begin{aligned}\text{Variance : } \sigma^2 &= \frac{(x_1 - m)^2 + (x_2 - m)^2 + \dots + (x_n - m)^2}{n} \\ &= \frac{1}{n} \sum_{i=1}^n (x_i - m)^2 = \frac{1}{n} \sum_{i=1}^n (x_i^2 - 2mx_i + m^2) \\ &= \frac{1}{n} \sum_{i=1}^n x_i^2 - 2m \times \frac{1}{n} \sum_{i=1}^n x_i + m^2 \times \frac{1}{n} \sum_{i=1}^n 1 \\ &= \frac{1}{n} \sum_{i=1}^n x_i^2 - 2m\end{aligned}$$

Mean, Variance, Standard Deviation of $x_1, x_2, x_3, \dots, x_n$

▶ Start

$x_1, x_2, x_3, \dots, x_n$

$$\begin{aligned}\text{Mean : } m &= \frac{x_1 + x_2 + x_3 + \dots + x_n}{n} \\ &= \frac{1}{n} \sum_{i=1}^n x_i\end{aligned}$$

$$\begin{aligned}\text{Variance : } \sigma^2 &= \frac{(x_1 - m)^2 + (x_2 - m)^2 + \dots + (x_n - m)^2}{n} \\ &= \frac{1}{n} \sum_{i=1}^n (x_i - m)^2 = \frac{1}{n} \sum_{i=1}^n (x_i^2 - 2mx_i + m^2) \\ &= \frac{1}{n} \sum_{i=1}^n x_i^2 - 2m \times \frac{1}{n} \sum_{i=1}^n x_i + m^2 \times \frac{1}{n} \sum_{i=1}^n 1 \\ &= \frac{1}{n} \sum_{i=1}^n x_i^2 - 2m \times m\end{aligned}$$

Mean, Variance, Standard Deviation of $x_1, x_2, x_3, \dots, x_n$

▶ Start

$x_1, x_2, x_3, \dots, x_n$

$$\begin{aligned}\text{Mean : } m &= \frac{x_1 + x_2 + x_3 + \dots + x_n}{n} \\ &= \frac{1}{n} \sum_{i=1}^n x_i\end{aligned}$$

$$\begin{aligned}\text{Variance : } \sigma^2 &= \frac{(x_1 - m)^2 + (x_2 - m)^2 + \dots + (x_n - m)^2}{n} \\ &= \frac{1}{n} \sum_{i=1}^n (x_i - m)^2 = \frac{1}{n} \sum_{i=1}^n (x_i^2 - 2mx_i + m^2) \\ &= \frac{1}{n} \sum_{i=1}^n x_i^2 - 2m \times \frac{1}{n} \sum_{i=1}^n x_i + m^2 \times \frac{1}{n} \sum_{i=1}^n 1 \\ &= \frac{1}{n} \sum_{i=1}^n x_i^2 - 2m \times m + m^2\end{aligned}$$

Mean, Variance, Standard Deviation of $x_1, x_2, x_3, \dots, x_n$

▶ Start

$x_1, x_2, x_3, \dots, x_n$

$$\begin{aligned}\text{Mean : } m &= \frac{x_1 + x_2 + x_3 + \dots + x_n}{n} \\ &= \frac{1}{n} \sum_{i=1}^n x_i\end{aligned}$$

$$\begin{aligned}\text{Variance : } \sigma^2 &= \frac{(x_1 - m)^2 + (x_2 - m)^2 + \dots + (x_n - m)^2}{n} \\ &= \frac{1}{n} \sum_{i=1}^n (x_i - m)^2 = \frac{1}{n} \sum_{i=1}^n (x_i^2 - 2mx_i + m^2) \\ &= \frac{1}{n} \sum_{i=1}^n x_i^2 - 2m \times \frac{1}{n} \sum_{i=1}^n x_i + m^2 \times \frac{1}{n} \sum_{i=1}^n 1 \\ &= \frac{1}{n} \sum_{i=1}^n x_i^2 - 2m \times m + m^2 \times \frac{1}{n} \times n\end{aligned}$$

Mean, Variance, Standard Deviation of $x_1, x_2, x_3, \dots, x_n$

▶ Start

$x_1, x_2, x_3, \dots, x_n$

$$\begin{aligned}\text{Mean : } m &= \frac{x_1 + x_2 + x_3 + \dots + x_n}{n} \\ &= \frac{1}{n} \sum_{i=1}^n x_i\end{aligned}$$

$$\begin{aligned}\text{Variance : } \sigma^2 &= \frac{(x_1 - m)^2 + (x_2 - m)^2 + \dots + (x_n - m)^2}{n} \\ &= \frac{1}{n} \sum_{i=1}^n (x_i - m)^2 = \frac{1}{n} \sum_{i=1}^n (x_i^2 - 2mx_i + m^2) \\ &= \frac{1}{n} \sum_{i=1}^n x_i^2 - 2m \times \frac{1}{n} \sum_{i=1}^n x_i + m^2 \times \frac{1}{n} \sum_{i=1}^n 1 \\ &= \frac{1}{n} \sum_{i=1}^n x_i^2 - 2m \times m + m^2 \times \frac{1}{n} \times n \\ &= \frac{1}{n} \sum_{i=1}^n x_i^2\end{aligned}$$

Mean, Variance, Standard Deviation of $x_1, x_2, x_3, \dots, x_n$

▶ Start

$x_1, x_2, x_3, \dots, x_n$

$$\begin{aligned}\text{Mean : } m &= \frac{x_1 + x_2 + x_3 + \dots + x_n}{n} \\ &= \frac{1}{n} \sum_{i=1}^n x_i\end{aligned}$$

$$\begin{aligned}\text{Variance : } \sigma^2 &= \frac{(x_1 - m)^2 + (x_2 - m)^2 + \dots + (x_n - m)^2}{n} \\ &= \frac{1}{n} \sum_{i=1}^n (x_i - m)^2 = \frac{1}{n} \sum_{i=1}^n (x_i^2 - 2mx_i + m^2) \\ &= \frac{1}{n} \sum_{i=1}^n x_i^2 - 2m \times \frac{1}{n} \sum_{i=1}^n x_i + m^2 \times \frac{1}{n} \sum_{i=1}^n 1 \\ &= \frac{1}{n} \sum_{i=1}^n x_i^2 - 2m \times m + m^2 \times \frac{1}{n} \times n \\ &= \frac{1}{n} \sum_{i=1}^n x_i^2 - 2m^2 +\end{aligned}$$

Mean, Variance, Standard Deviation of $x_1, x_2, x_3, \dots, x_n$

▶ Start

$x_1, x_2, x_3, \dots, x_n$

$$\begin{aligned}\text{Mean : } m &= \frac{x_1 + x_2 + x_3 + \dots + x_n}{n} \\ &= \frac{1}{n} \sum_{i=1}^n x_i\end{aligned}$$

$$\begin{aligned}\text{Variance : } \sigma^2 &= \frac{(x_1 - m)^2 + (x_2 - m)^2 + \dots + (x_n - m)^2}{n} \\ &= \frac{1}{n} \sum_{i=1}^n (x_i - m)^2 = \frac{1}{n} \sum_{i=1}^n (x_i^2 - 2mx_i + m^2) \\ &= \frac{1}{n} \sum_{i=1}^n x_i^2 - 2m \times \frac{1}{n} \sum_{i=1}^n x_i + m^2 \times \frac{1}{n} \sum_{i=1}^n 1 \\ &= \frac{1}{n} \sum_{i=1}^n x_i^2 - 2m \times m + m^2 \times \frac{1}{n} \times n \\ &= \frac{1}{n} \sum_{i=1}^n x_i^2 - 2m^2 + m^2\end{aligned}$$

Mean, Variance, Standard Deviation of $x_1, x_2, x_3, \dots, x_n$

▶ Start

$x_1, x_2, x_3, \dots, x_n$

$$\begin{aligned}\text{Mean : } m &= \frac{x_1 + x_2 + x_3 + \dots + x_n}{n} \\ &= \frac{1}{n} \sum_{i=1}^n x_i\end{aligned}$$

$$\begin{aligned}\text{Variance : } \sigma^2 &= \frac{(x_1 - m)^2 + (x_2 - m)^2 + \dots + (x_n - m)^2}{n} \\ &= \frac{1}{n} \sum_{i=1}^n (x_i - m)^2 = \frac{1}{n} \sum_{i=1}^n (x_i^2 - 2mx_i + m^2) \\ &= \frac{1}{n} \sum_{i=1}^n x_i^2 - 2m \times \frac{1}{n} \sum_{i=1}^n x_i + m^2 \times \frac{1}{n} \sum_{i=1}^n 1 \\ &= \frac{1}{n} \sum_{i=1}^n x_i^2 - 2m \times m + m^2 \times \frac{1}{n} \times n \\ &= \frac{1}{n} \sum_{i=1}^n x_i^2 - 2m^2 + m^2 = \frac{1}{n} \sum_{i=1}^n x_i^2\end{aligned}$$

Mean, Variance, Standard Deviation of $x_1, x_2, x_3, \dots, x_n$

▶ Start

$x_1, x_2, x_3, \dots, x_n$

$$\begin{aligned}\text{Mean : } m &= \frac{x_1 + x_2 + x_3 + \dots + x_n}{n} \\ &= \frac{1}{n} \sum_{i=1}^n x_i\end{aligned}$$

$$\begin{aligned}\text{Variance : } \sigma^2 &= \frac{(x_1 - m)^2 + (x_2 - m)^2 + \dots + (x_n - m)^2}{n} \\ &= \frac{1}{n} \sum_{i=1}^n (x_i - m)^2 = \frac{1}{n} \sum_{i=1}^n (x_i^2 - 2mx_i + m^2) \\ &= \frac{1}{n} \sum_{i=1}^n x_i^2 - 2m \times \frac{1}{n} \sum_{i=1}^n x_i + m^2 \times \frac{1}{n} \sum_{i=1}^n 1 \\ &= \frac{1}{n} \sum_{i=1}^n x_i^2 - 2m \times m + m^2 \times \frac{1}{n} \times n \\ &= \frac{1}{n} \sum_{i=1}^n x_i^2 - 2m^2 + m^2 = \frac{1}{n} \sum_{i=1}^n x_i^2 - m^2\end{aligned}$$

Mean, Variance, Standard Deviation of $x_1, x_2, x_3, \dots, x_n$

▶ Start

$x_1, x_2, x_3, \dots, x_n$

$$\begin{aligned}\text{Mean : } m &= \frac{x_1 + x_2 + x_3 + \dots + x_n}{n} \\ &= \frac{1}{n} \sum_{i=1}^n x_i\end{aligned}$$

$$\begin{aligned}\text{Variance : } \sigma^2 &= \frac{(x_1 - m)^2 + (x_2 - m)^2 + \dots + (x_n - m)^2}{n} \\ &= \frac{1}{n} \sum_{i=1}^n (x_i - m)^2 = \frac{1}{n} \sum_{i=1}^n (x_i^2 - 2mx_i + m^2) \\ &= \frac{1}{n} \sum_{i=1}^n x_i^2 - 2m \times \frac{1}{n} \sum_{i=1}^n x_i + m^2 \times \frac{1}{n} \sum_{i=1}^n 1 \\ &= \frac{1}{n} \sum_{i=1}^n x_i^2 - 2m \times m + m^2 \times \frac{1}{n} \times n \\ &= \frac{1}{n} \sum_{i=1}^n x_i^2 - 2m^2 + m^2 = \frac{1}{n} \sum_{i=1}^n x_i^2 - m^2\end{aligned}$$

Standard Deviation

Mean, Variance, Standard Deviation of $x_1, x_2, x_3, \dots, x_n$

▶ Start

$x_1, x_2, x_3, \dots, x_n$

$$\begin{aligned}\text{Mean : } m &= \frac{x_1 + x_2 + x_3 + \dots + x_n}{n} \\ &= \frac{1}{n} \sum_{i=1}^n x_i\end{aligned}$$

$$\begin{aligned}\text{Variance : } \sigma^2 &= \frac{(x_1 - m)^2 + (x_2 - m)^2 + \dots + (x_n - m)^2}{n} \\ &= \frac{1}{n} \sum_{i=1}^n (x_i - m)^2 = \frac{1}{n} \sum_{i=1}^n (x_i^2 - 2mx_i + m^2) \\ &= \frac{1}{n} \sum_{i=1}^n x_i^2 - 2m \times \frac{1}{n} \sum_{i=1}^n x_i + m^2 \times \frac{1}{n} \sum_{i=1}^n 1 \\ &= \frac{1}{n} \sum_{i=1}^n x_i^2 - 2m \times m + m^2 \times \frac{1}{n} \times n \\ &= \frac{1}{n} \sum_{i=1}^n x_i^2 - 2m^2 + m^2 = \frac{1}{n} \sum_{i=1}^n x_i^2 - m^2\end{aligned}$$

Standard Deviation : $\sigma = \sqrt{\sigma^2}$

▶ Home

END