

| Example

- A simple random sample of five men is chosen from a large population of men, and their heights are measured. The five heights (in inches) are **65.51, 72.30, 68.31, 67.05, and 70.68**. Find the sample mean.

متوسط

$$\bar{X} = \frac{\sum_{i=1}^n x_i}{n}$$

$$\bar{X} = \frac{65.51 + 72.3 + 68.31 + 67.05 + 70.68}{5} = \underline{\underline{68.77 \text{ in}}}$$

| The Standard Deviation

Set 1

28, 29, 30, 31, 32

$$\bar{X} = 30$$

Mean

Set 2

10, 20, 30, 40, 50

$$\bar{X} = 30$$

⇒ Standard deviation

deviation

Speed

$$d_1 = |10 - 30| = |-20| = 20$$

$$d_2 = |20 - 30| = |-10| = 10$$

الاختلاف الجبري

| The Standard Deviation

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

Varian Ce

مقدار اختلاف

$$(*) \quad S^2 = \frac{1}{\underline{n-1}} \sum_{i=1}^n (x_i - \bar{x})^2 \Rightarrow \underline{\text{Varian Ce}}$$

$\downarrow$ sample item $\uparrow$ mean

$$(*) \quad S^2 = \frac{1}{\underline{n-1}} \left(\sum_{i=1}^n x_i^2 - n \bar{x}^2 \right)$$

Standard deviation

$$\textcircled{*} S = \sqrt{\frac{1}{\underline{n-1}} \sum_{i=1}^n (x_i - \bar{x})^2}$$

$$\textcircled{*} S = \sqrt{\frac{1}{\underline{n-1}} \left(\sum_{i=1}^n x_i^2 - n \bar{x}^2 \right)}$$

| The Standard Deviation

- A **simple random sample** of five men is chosen from a large population of men, and their heights are measured. The five heights (in inches) are 65.51, 72.30, 68.31, 67.05, and 70.68.
- Find the sample variance and the sample standard deviation for the height data

$$\begin{aligned} \frac{s^2}{5} &= \frac{1}{4} \left(65.51^2 + 72.3^2 + 68.3^2 + 67.05^2 + 70.68^2 - 5(68.77^2) \right) \\ &= 7.47665 \end{aligned}$$

$$s = \sqrt{7.47665} = \boxed{2.73}$$