

Variance

1. Introduction

- Variance is measure of dispersion of variable's values around its [mean value](#).
- Variance is calculated as [mean value](#) of set of values $(x_i - \bar{x})^2$:

$$\text{var}(x) = \frac{1}{N} \sum_{i=1}^N (x_i - \bar{x})^2 \quad (1.1)$$

where: $\text{var}(x)$ – variance of variable x ,
 \bar{x} – [mean value](#) of variable x ,
 x_i – value of variable x taken at i -th measurement.

- Variance is always positive number and the bigger it is greater the dispersion.
- Zero variance means that that value of variable x is always the same in which case [mean value](#) equals that variable's value.
- For instance if we had recorded following values for variable x :

$$x_i \in \{3, 4, -5, 5, 2, 6\} \quad , \quad N=6 \quad , \quad \bar{x}=2.5$$

then variance would be:

$$\text{var}(x) = (3-2.5)^2 + (4-2.5)^2 + (-5-2.5)^2 + (5-2.5)^2 + (2-2.5)^2 + (6-2.5)^2 = 0 + 1 + 64 + 4 + 1 + 9 = 79$$

- Following figure shows few examples of calculating variance:

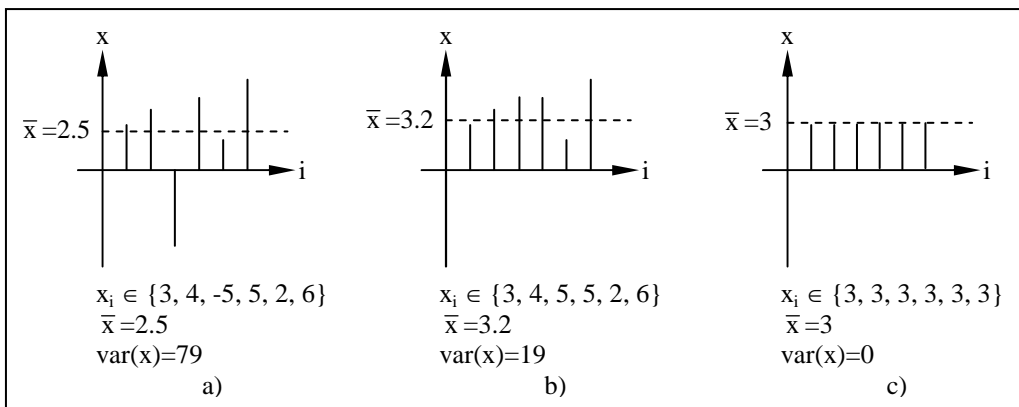


Figure 1.1 Examples of calculating variance.