

Descriptive Statistics

This worksheet calculates descriptive statistics including; average, standard deviation (N and N-1 weighted), and confidence intervals for a data set.

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Number of measurements:

$$N := 20$$

$$i := 0, 1..N - 1$$

Data Points:

$X_i :=$
25.160
23.227
24.402
23.924
20.730
23.615
23.648
23.747
23.613
22.910
25.075
24.301
24.611
25.133
24.152
24.196
24.775
23.841
24.883
25.561

AVERAGE

$$\bar{x} := \sum_i \frac{X_i}{N}$$

$$\bar{x} = 24.1752$$

STD (N)

$$\sigma := \sqrt{\left[\sum_i (X_i - \bar{x})^2 \right] \cdot (N)^{-1}}$$

$$\sigma = 1.03872$$

STD (N-1)

$$s := \sqrt{\left[\sum_i (X_i - \bar{x})^2 \right] \cdot (N - 1)^{-1}}$$

$$s = 1.0657$$

Confidence Interval ($\bar{x} \pm s_m$):

$$s_m(\text{CI}) := \text{qt}\left(\text{CI} + \frac{1 - \text{CI}}{2}, N - 1\right) \cdot \frac{s}{\sqrt{N}}$$

$$\text{CI} := 90\% \quad s_m(\text{CI}) = 0.41205$$

Comparison to true value:

$$\mu := 24$$

$$t_{\text{experimental}} := \frac{|\bar{x} - \mu|}{s} \cdot \sqrt{N}$$

$$t_{\text{experimental}} = 0.73522$$

$$t_{\text{critical}}(\text{CI}) := \text{qt}\left(\text{CI} + \frac{1 - \text{CI}}{2}, N - 1\right)$$

$$t_{\text{critical}}(90\%) = 1.72913$$