Estimating The Mean of A Single Population: Known Variance

A computer scientist is investigating the usefulness of a design language in improving programming tasks. Twelve expert programmers are asked to code a standard function in the language, and the times (in minutes) are recorded. The data are:

17 16 21 14 18 24 16 14 21 23 13 18

The point estimate of μ is $\overline{y} = 17.9167$.

Suppose we know $\sigma = 3.6296$. Then the standard error of $\overline{y}$ is

$$\sigma(\overline{y}) = \frac{\sigma}{\sqrt{n}} = \frac{3.6296}{\sqrt{12}} = 1.0478,$$

and a 95% confidence interval for μ is

$$\begin{aligned} &\left(\overline{y} - \sigma(\overline{y}) z_{0.975}, \overline{Y} + \sigma(\overline{Y}) z_{0.975}\right) \\ &= (17.9167 - (1.0478)(1.96), 17.9167 + (1.0478)(1.96)) \\ &= (15.8630, 19.9704). \end{aligned}$$

Based on these data, we estimate that μ lies in the interval (15.8630,19.9704).

We are 95% confident in our conclusion, meaning that in repeated sampling, 95% of all intervals computed in this way will contain the true value of μ.