

Conditions

Use the given degree of confidence and sample data to construct a confidence interval for the population means. A random sample of 15 light bulbs had a mean life of 548 hours and a sample standard deviation of 29 hours. Find a 90 percent confidence interval for the mean life, μ , of all light bulbs of this type.

Solution

$$0.9 = P\left(-1.65 \leq \frac{\bar{X} - \mu}{\frac{\sigma}{\sqrt{n}}} \leq 1.65\right)$$

Where:

1.65 – the value of cumulative distribution function at a point $p=0.9$

\bar{X} - sample mean

μ – distribution mean

σ – standard deviation

n – sample size.

The confidence interval is:

$$\left(\bar{X} - 1.65 \frac{\sigma}{\sqrt{n}} \leq \mu \leq \bar{X} + 1.65 \frac{\sigma}{\sqrt{n}}\right) = \left(548 - 1.65 \frac{29}{\sqrt{15}} \leq \mu \leq 548 + 1.65 \frac{29}{\sqrt{15}}\right)$$

$$535,64518 \leq \mu \leq 560,35482$$