

Conditions

The quality control officer of a certain firm specializing in manufacturing female T-shirts of varying shoulder sizes wishes to find out the mean shoulder size of all the T-shirts produced. She takes a random of 150 T-shirts which gave a mean shoulder size of 16 inches and a standard deviation of 2 inches. Construct a 98% confidence interval for the mean shoulder size of all the T-shirts produced by the company.

Solution

$$n = 150, \bar{X} = 16, \sigma = 2$$

The confidence interval:

$$\bar{X} - t \frac{\sigma}{\sqrt{n}} \leq \mu \leq \bar{X} + t \frac{\sigma}{\sqrt{n}}$$

Let's find the error function for our confidence level:

$$\Phi(t) = 0.49, t = 2.33$$

Then the interval is:

$$16 - 2.33 \frac{2}{\sqrt{12.25}} \leq \mu \leq 16 + 2.33 \frac{2}{\sqrt{12.25}}$$

$$15.6196 \leq \mu \leq 16.3804$$