

## Answer on Question #71011 – Math – Statistics and Probability

### Question

In 12 test runs an experimental engine consumed on the average 12.9 gallons of gasoline per minute with a standard deviation of 1.6 gallons.

- a)** Construct a 90% confidence interval for the average gasoline consumption of the engine.  
**b)** Construct a 95% confidence interval for the standard deviation.

### Solution

$$\begin{aligned} \text{a) } 90\%CI &= \left( \bar{x} - t_{0.05,11} \frac{s}{\sqrt{n}}, \bar{x} + t_{0.05,11} \frac{s}{\sqrt{n}} \right) = \\ &= \left( 12.9 - 1.796 \frac{1.6}{\sqrt{12}}, 12.9 + 1.796 \frac{1.6}{\sqrt{12}} \right) = (12.07, 13.73). \end{aligned}$$

$$\begin{aligned} \text{b) } 95\%CI &= \left( s \sqrt{\frac{n-1}{\chi_{0.025}^2}}, s \sqrt{\frac{n-1}{\chi_{0.975}^2}} \right) = \left( 1.6 \sqrt{\frac{12-1}{21.92}}, 1.6 \sqrt{\frac{12-1}{3.815}} \right) = \\ &= (1.13, 2.717). \end{aligned}$$

**Answer: a)** (12.07, 13.73); **b)** (1.13, 2.717).