

3.5 A study of the annual growth of certain cacti showed that 64 of them, selected at random in a desert region, grew on the average 52.80 mm with a standard deviation of 4.5 mm. Construct a 99 percent confidence interval for the true average annual growth of the given kind of cactus.

Solution

We want a 99% confidence interval for a mean (large sample so no need to worry about the population from which the sample was taken).

$$\alpha = 0.01$$

Sample Data

$$n = 64$$

$$\bar{x} = 52.80$$

$$S = 4.5$$

Formula

$$\bar{x} - E < \mu < \bar{x} + E \quad 52.80 - E < \mu < 52.80 + E \quad 52.80 - 1.49 < \mu < 52.80 + 1.49$$

$(51.31, 54.29)$

$$E = t_{\frac{\alpha}{2}} \frac{s}{\sqrt{n}}$$

$$E = 2.654 \frac{4.5}{\sqrt{64}} \approx 1.49$$

Note: In this formula, the critical value is from Table A-3 with $df = 65$ because there is not an entry for $df = 63$.

However, the TI-83/84 will give the correct critical value. The correct critical should be approximately 2.656145

On the TI-83/84

STAT >> TESTS '8: T Interval ...' $(51.306, 54.294)$