Question

A random sample of 60 individuals was selected as part of a study on drug usage. The average usage was found to be 350 mg. For the population in the March quarter of the previous year it was found that the population mean usage was 355 mg and standard deviation of the usage was 81mg. Significance level α = 0.05.

Calculate the 95% and 99.7% confidence interval for the population mean.

Solution:

We don't know the population mean from which that sample was taken, but we have what could be seen as a population estimation from a subset of the population (March quarter 2018)

The sample size is greater than 30 (n=60), the sample is an SRS and we assume that the population is 20 times larger than the sample. This satisfies normality conditions.

Because we have an estimation for the standard deviation of the population and not the actual standard deviation, we'll use t-test to calculate the confidence intervals.

Given:

$$n = 60,$$

$$\bar{x} = 350$$

$$df = n - 1 = 59$$

$$s = 81$$

- Calculate the 95% confidence interval:

$$@ \propto = 0.05, t_c = \pm 2.001$$

$$CI = 350 \pm 2.001 * \frac{81}{\sqrt{60}}$$

$$CI = (329.075, 370.925)$$

- Calculate the 99.7% confidence interval:

$$@ \propto = 0.003, t_c = \pm 3.096$$

$$I = 350 \pm 3.096 * \frac{81}{\sqrt{60}}$$

$$CI = (\,317.625, 382.375)$$