Answer on Question #84191 – Math – Statistics and Probability

A random sample of size 64 has been drawn from a population with standard deviation 20. The mean of the sample is 80.

Question

i) Calculate 95% confidence limits for the population mean.

Solution

95% confidence limits:

$$\bar{x} \pm 1.96\sigma/\sqrt{n}$$

We have:

$$\bar{x} = 80\ ;\ \sigma = 20\ ;\ n = 64$$

$$80 - 1.96 \cdot \frac{20}{\sqrt{64}} = 75.1$$

$$80 + 1.96 \cdot \frac{20}{\sqrt{64}} = 84.9$$

Answer: $(75.1,\ 84.9)$.

Question

ii) How does the width of the confidence interval changes if the sample size is 256 instead?

Solution

The width of the confidence interval for $n = 64$:

$$84.9 - 75.1 = 9.8$$

Confidence limits for $n = 256$:

$$80 - 1.96 \cdot \frac{20}{\sqrt{256}} = 77.55$$

$$80 + 1.96 \cdot \frac{20}{\sqrt{256}} = 82.45$$

The width of the confidence interval for $n = 256$:

$$82.45 - 77.55 = 4.9,$$

which is less than the width of the confidence interval for $n = 64$.

Answer: the confidence interval will be twice less.