Answer on Question #855579 – Math – Statistics and Probability

Question

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

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

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

Solution

i) $95\%CI = \left(\bar{x} - z_{0.025}\frac{s}{\sqrt{n}}, \ \bar{x} + z_{0.025}\frac{s}{\sqrt{n}}\right) =$

$$= \left(80 - 1.96\frac{20}{\sqrt{64}}, 80 + 1.96\frac{20}{\sqrt{64}}\right) = (75.1, 84.9).$$

Width of the confidence interval: $84.9 - 75.1 = 9.8$.

ii) $95\%CI = \left(\bar{x} - z_{0.025}\frac{s}{\sqrt{n}}, \ \bar{x} + z_{0.025}\frac{s}{\sqrt{n}}\right) =$

$$= \left(80 - 1.96\frac{20}{\sqrt{256}}, 80 + 1.96\frac{20}{\sqrt{256}}\right) = (77.55, 82.45).$$

Width of the confidence interval: $82.45 - 77.55 = 4.9$.

The width will decrease by 2 times.