

Answer on Question #84685 – Math – Statistics and Probability

Question

From a random sample of 65 people in a certain town, the proportion who own a bicycle was noted. From this result an $\alpha\%$ confidence interval for the proportion, p , of all people in the town who own a bicycle was calculated to be $0.284 < p < 0.516$.

(i) Find the proportion of people in the sample who own a bicycle.

Solution

$$\mu_{\hat{p}} = \hat{p} = \frac{0.284 + 0.516}{2} = 0.4$$

$$\hat{p}(1 - \hat{p}) = 65(0.4)(1 - 0.4) = 15.6 \geq 10$$

Then the distribution of the sample proportion is approximately normal.

Standard deviation of sampling distribution

$$\sigma_{\hat{p}} = \sqrt{\frac{\hat{p}(1 - \hat{p})}{n}} = \sqrt{\frac{0.4(1 - 0.4)}{65}} \approx 0.0608$$

Confidence interval

$$CI = \hat{p} \pm z_{\alpha/2} \sqrt{\frac{\hat{p}(1 - \hat{p})}{n}}$$

$$z_{\alpha/2} = \frac{0.516 - 0.4}{\sqrt{\frac{0.4(1 - 0.4)}{65}}} \approx 1.9090$$

$$P(Z \leq 1.9090) \approx 0.971869$$

$$P - \text{value} = 2 \cdot (1 - 0.971869) \approx 0.0563.$$