

Answer on Question #67667 – Math – Statistics and Probability

Question

An environmental agency worries that many cars may be violating clean air emissions standards. The agency hopes to check a sample of vehicles in order to estimate that percentage with a margin of error of 5% and 90% confidence. To gauge the size of the problem, the agency first picks 80 cars and finds 16 with faulty emissions systems. How many should be sampled for a full investigation?

Solution

Sample proportion is

$$\hat{p} = \frac{16}{80} = 0.2.$$

Margin of error is

$$ME = z_{0.05} \sqrt{\frac{\hat{p}(1 - \hat{p})}{n}} \rightarrow$$

The sample is

$$\rightarrow n = \left(\frac{z_{0.05}}{ME}\right)^2 \hat{p}(1 - \hat{p}) = \left(\frac{1.645}{0.05}\right)^2 \cdot 0.2 \cdot 0.8 = 174.$$

Answer: 174.