

Answer on Question #67670 – Math – Statistics and Probability

Question

Wildlife biologists inspect 152 deer taken by hunters and find 24 of them carrying ticks that test positive for Lyme disease.

a) Create a 90% confidence interval for the percentage of deer that may carry such ticks.

Solution

The point estimate for the population proportion

$$\hat{p} = \frac{x}{n} = \frac{24}{152} = 0.158$$

The standard error

$$SE = \sqrt{\frac{\hat{p}(1-\hat{p})}{n}} = \sqrt{\frac{0.158(1-0.158)}{152}} = 0.030$$

The critical values

The 90% confidence level corresponds to $\alpha = 0.10$. To determine the confidence interval one needs to find the critical value $z_{\frac{\alpha}{2}} = z_{0.05}$. The z -score associated with the given probability value can be either obtained from the standard normal table or calculated using the technology:

$$z_{0.05} = 1.645$$

The margin of error is

$$E = z_{\frac{\alpha}{2}} SE = 1.645 \cdot 0.030 = 0.049$$

$$\text{Lower endpoint} = \hat{p} - E = 0.158 - 0.049 = 0.109$$

$$\text{Upper endpoint} = \hat{p} + E = 0.158 + 0.049 = 0.207$$

The 90% confidence interval for population proportion is (0.109, 0.207).

The 90% confidence interval for population percentage is (10.9%, 20.7%).

Answer: (10.9%, 20.7%).

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