
UNIVERSITY OF TEXAS AT AUSTIN

Quiz # 10

Statistical inference for one-sample proportions.

Provide your **complete solution** for the following problems.

Problem 10.1. (7 points)

A simple random sample of 120 veterinarian clinics in a certain region reveals that the vast majority of clinics only treat small pets (dogs, cats, rabbits, etc.) and not large animals (cows, horses, etc.). Of the 120 clinics sampled, 88 responded that they do not treat large animals at their clinic.

- (i) (2 points) What is the value of the standard error of the sample proportion of clinics which do treat large animals?

Solution:

$$\sqrt{\frac{(88/120)(32/120)}{120}} = 0.0404.$$

- (ii) (4 points) What is a 90% confidence interval for the population proportion of vet clinics that do treat large animals?

Solution:

$$\frac{32}{120} \pm 1.645 \times 0.0404 = 0.27 \pm 0.0665.$$

- (iii) (1 point) If a 95% confidence interval were calculated instead of 90% confidence interval, what would happen to the width of the confidence interval?

Solution: The width of the interval would increase.

Problem 10.2. (8 points)

After a college football team once again lost a game to their archrival, the alumni association conducted a survey to see if alumni were in favor of firing the coach. A simple random sample of 100 alumni from the population of all living alumni was taken. Sixty-four of the alumni in the sample were in favor of firing the coach. Let p represent the proportion of all living alumni who favored firing the coach. Suppose the alumni association wished to see if the majority of alumni are in favor of firing the coach. To do this they test the hypotheses

$$H_0 : p = 0.50 \quad \text{versus} \quad H_a : p > 0.50.$$

What is the p -value for this hypothesis test?

Solution: The observed value of the z statistic under the null hypothesis is

$$\frac{0.64 - 0.5}{\sqrt{\frac{0.25}{100}}} = 2.8.$$

The p -value is

$$1 - \Phi(2.8) = 1 - 0.9974 = 0.0026.$$