STAT:1020 discussion - week 13

Issac Lee

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Chap. 13 Review

Construct a confidence interval for a proportion p

- Usual form of Confidence Interval (C.I.)

$$(\hat{p} - z^* \times SE(\hat{p}), \hat{p} + z^* * SE(\hat{p}))$$

or

$$\hat{p} \pm z^* * SE(\hat{p})$$

- Therefore, a form of confidence interval: $(\hat{p} + ME)$
- ME (margin of error): critical value × standard error
- Popular critical values (z^*): 2 for 95% C.I., 1.645 for 90% C.I.
- Standard error of a sample proportion is

$$SE(\hat{p}) = \sqrt{\frac{\hat{p}\,\hat{q}}{n}}$$

Problem 1.

State police believe that 70% of the drivers traveling on a major interstate highway drive faster than the speed limit. They set up a radar trap to check the speeds of 12 cars. They want to apply Normal model for the distribution of the sample proportion.

Problem 2.

A random sample of 600 is drawn from a population having $p = 0.7$.

1. What is the expected value for the sampling distribution of the proportion?
2. What is the standard error for the sampling distribution of the proportion?
3. What is the chance that the sample proportion is greater than 0.8?

Problem 3.

In the Spring of 2019, 45% of a random sample of 402 adult Iowa residents said they thought they are good at playing tennis.

1. What is the standard error for the sampling proportion?

2. What is the margin of error for the proportion of all adult Iowa residents who think they are good at playing tennis with 90% confidence?
3. Explain what this margin of error means.

   We are 90% confident that the observed proportion of adults who are good at tennis is within ____ of the population proportion.

4. What is a 90% confidence interval for the proportion of adult Iowa residents who think they are good at playing tennis?

5. How do you interpret the C.I. you have from the above?

   We are ___ % confident that, if we ask ALL adult Iowa residents whether they are good at tennis, between ___ % and ____ % of them would say they are good at tennis.

Problem 4.

A survey organization wants to take a simple random sample in order to estimate the proportion of people who have seen a certain television program. To keep the costs down, they want to take as small a sample as possible, but their client will only tolerate chance errors of 0.01 in the estimate. Assume the population is very large, and past experience suggests the population proportion will be about 0.3. What sample size should they use?