Discussion 3

8/20/2024

Dan Chen

Factors affecting confidence interval

$$CI = \bar{x} \pm z\frac{s}{\sqrt{n}}$$

Which variable is associated with the confidence level?

If n = 100, how many more samples do we need to cut the margin of error in half?

Practice problem (3.CE.27)

In the mid-1980s, sociologist Shere Hite undertook a study of American women's attitudes toward relationships, love, and sex by distributing 100,000 questionnaires in women's groups. One of the questions was: Do you give more emotional support to your husband or boyfriend than you receive from him? A total of 4,500 women returned the questionnaire. An ABC News/Washington Post poll conducted at about the same time surveyed a random sample of 767 women, asking them the same question about emotional support.

a. Which survey would you expect to obtain a more representative sample of the population? Explain briefly. Of the 4,500 women who returned the Hite questionnaire, 96% said that they gave more emotional support than they received from their husbands or boyfriends. Of the 767 women interviewed in the ABC News/Washington Post poll, 44% claimed to give more emotional support than they receive.

b. Using only the poll corresponding to your answer to part (a), determine a 99% confidence interval for the relevant population parameter.

Practice problem (3.CE.27)

In the mid-1980s, sociologist Shere Hite undertook a study of American women's attitudes toward relationships, love, and sex by distributing 100,000 questionnaires in women's groups. One of the questions was: Do you give more emotional support to your husband or boyfriend than you receive from him? A total of 4,500 women returned the questionnaire. An ABC News/Washington Post poll conducted at about the same time surveyed a random sample of 767 women, asking them the same question about emotional support.

c. Write a sentence interpreting what your confidence interval reveals.

d. If you were to calculate the margin of error for both surveys (do not bother to actually do this calculation), which survey would have the smaller margin of error? Explain briefly.

e. Calculate the margin of error for both surveys. How much larger does the sample size of the second survey need to be in order to have the same margin of error?

Practice problem (3.CE.23)

A student went to the local county courthouse (in Cumberland County, Pennsylvania, in June and July of 1993) to gather data on ages of soon-to-be husbands and wives who had recently applied for marriage licenses. He gathered age data on a sample of 100 couples and calculated the difference in age (husband–wife) for each couple. The results can be found in the file MarriageAgesDiff.txt

a. Create a plot to visualize the data.

b. Do you consider it valid to use a theory-based confidence interval for a population mean, based on these sample data? Explain.

c. Determine a 99% confidence interval for the population mean.

Practice problem (3.CE.23)

A student went to the local county courthouse (in Cumberland County, Pennsylvania, in June and July of 1993) to gather data on ages of soon-to-be husbands and wives who had recently applied for marriage licenses. He gathered age data on a sample of 100 couples and calculated the difference in age (husband–wife) for each couple. The results can be found in the file MarriageAgesDiff.txt

d. Interpret the interval that you calculated in part (c).

e. Based on this confidence interval, do the sample data provide strong evidence for concluding that husbands tend to be older than their wives, on average? Explain how your answer follows from the confidence interval.

f. To what population of married couples do you feel comfortable generalizing the results of this study? Explain