AP Statistics
Ch. 8 Estimating Proportions

Point estimator:

Point estimate:

1. In each of the following settings, determine the point estimator you would use and calculate the value of the point estimate.

a. The makers of a new golf ball want to estimate the median distance the new balls will travel when hit by a mechanical driver. They select a random sample of 10 balls and measure the distance each ball travels after being hit by the mechanical driver. Here are the distances (in yards):

282 284 284 285 285 285 286 287 288 290

(b) The golf ball manufacturer would also like to investigate the variability of the distance travelled by the golf balls by estimating the interquartile range.

(c) The math department wants to know what proportion of its students own a graphing calculator, so they take a random sample of 100 students and find that 28 own a graphing calculator.

Confidence interval:

Margin of Error:

Confidence level:

Interpreting Confidence Levels:

Interpreting Confidence Interval

2. According to the American Community Survey, a 95% confidence interval for the median household income in Texas during the years 2009–2011 is $58,929 ± $218.

a. Interpret the confidence interval

b. Interpret the confidence level

c. True or False: The interval from $58,711 to $59,147 has a 95% chance of containing the actual median household income in Texas. Justify your answer.

Decreasing the Margin of Error:

Formula for Calculating a Confidence Interval:

3. As part of a project about response bias, Kody surveyed a random sample of 40 students from his school. Both of Kody's parents are dentists, so many of his survey questions had to do with brushing teeth. One of the questions required students to state aloud whether or not they brush their teeth twice a day. Based on the responses, Kody said he was 90% confident that the interval from 0.79 to 0.96 captures the true proportion of all students at the school who brush their teeth twice a day.

(a) Explain what would happen to the length of the interval if the confidence level were increased to 99%.

(b) Explain what would happen to the length of a 90% confidence interval if the sample size was increased to 100 students.

(c) Describe one potential source of bias in Kody's study that is not accounted for by the margin of error.

One-Sample z Interval for a Population Proportion

Standard error:

Conditions for Constructing Confidence Interval for a Population Proportion:

Sample Size for Desired Margin of Error:

4. Students in an AP Statistics class wants to estimate the proportion of pennies in circulation that are more than 10 years old using a 99% confidence interval. To do this, they gathered all the pennies they had in their pockets and purses. Overall, 57 of the 102 pennies they have are more than 10 years old.

STATE:

PLAN:

DO:

CONCLUDE:

THINK ABOUT IT: Is it plausible that more than 60% of all pennies in circulation are more than 10 years old? Justify your answer using the information from the preceding inference procedure.

Two-Sample Z Interval for the Difference Between Two Proportions:

Conditions for Constructing Confidence Interval for Difference in Proportions:

5. A recent random sample of 200 U.S. females revealed 110 use Twitter regularly. A separate random sample of 150 males revealed that 60 use Twitter regularly.

a. Calculate the standard error of the sampling distribution of the difference in the sample proportions (females – males) Interpret this value.

b. Use the results of these samples to construct a 95% confidence interval for the true difference in proportions who use Twitter regularly (females – male).

6. A Pew Research Center poll asked independent random samples of working women and men how much they value job security. Of the 806 women, 709 said job security was very or extremely important, compared with 802 of the 944 men surveyed.

Construct and interpret a 95% confidence interval for the difference in the proportion of all working women and men who consider job security very or extremely important.