

AP Statistics

Chapter 8: Estimating with Confidence

Day 6

HW: Lesson 6 Practice Worksheet

Example

As part of their final AP project, Christina and Rachel randomly selected 18 rolls of a generic brand of toilet paper to measure how well this brand could absorb water. To do this, they poured 1/4 cup of water onto a hard surface and counted how many squares it took to completely absorb the water. Here are their results:

$$\bar{x} = 24.94$$

$$s_{\bar{x}} = 2.8589$$

29	20	25	29	21	24	27	25	24
29	24	27	28	21	25	26	22	23

**when I graphed the data, there were no outliers or skewness*

Construct and interpret a 95% confidence interval for the mean number of squares of generic toilet paper needed to absorb 1/4 cup of water. *so I can assume the data approx. normal.*

$$n = 18$$

$$df = 17$$

$$CL = 95\%$$

*I used my calculator and performed a
t-interval test.*

$$: (23.523, 26.366)$$

Choosing a Sample Size

What if we want to choose a sample size that allows us to estimate a population proportion within a given margin of error?

Remember:

$$CI = \bar{X} \pm \text{critical value} \cdot SE$$

So:

$$\text{critical value} \cdot SE \leq ME$$

We need at least
374 young women.

Example

The body mass index (BMI) of all American young women is believed to follow a normal distribution with a standard deviation of about 7.5. How large of a sample size would be needed to estimate the mean BMI μ in this population to within 1 with 99% confidence?

$$\sigma = 7.5$$

$$z^* \frac{\sigma}{\sqrt{n}} \leq ME$$

$$ME = 1$$

$$CL = 99\%$$

$$\frac{2.576 \left(\frac{7.5}{\sqrt{n}} \right)}{2.576} \leq \frac{1}{2.576}$$

$$(19.319 \leq \sqrt{n})^2$$

$$373.26 \leq n$$

$$\cancel{\sqrt{n}} \cdot \frac{7.5}{\cancel{\sqrt{n}}} \leq .3882 \sqrt{n}$$

$$\frac{7.5}{.3882} \leq \frac{.3882 \sqrt{n}}{.3882}$$