

AFTER 8.2

STA 2c: Sect. 9.1 Worksheet  
CONFIDENCE INTERVALS

Name \_\_\_\_\_

1.  $\hat{p}$  is called the Sample proportion and  $p$  is a Population proportion.

Which is a parameter?  $p$  Which is a statistic?  $\hat{p}$

2. A major concern today is the safety of people talking on cell phones while driving. A survey of 12,000 teenagers in Texas found that 5,762 admitted to talking on a cell phone while driving. While this sample is not an SRS, it is close enough that our method gives an approximately correct confidence interval.

a. Find  $\hat{p}$ .  $\frac{5762}{12,000} = .480$

b. What is the population of interest? all teenagers in Texas who drive

c. What type of bias is likely to occur in this survey? Do you think the proportion of teenagers talking on a cell phone while driving is higher or lower than stated above? Explain.

Response bias - teenagers will lie about cell phone use while driving. It's probably the actual rate is higher

d. Using the formula for a confidence interval,  $\hat{p} \pm z^* \sqrt{\frac{\hat{p}(1-\hat{p})}{n}}$ , find each of the following intervals. Show substitutions into the formula.

90% confidence interval: (.4725, .4875)

95% confidence interval: (.4712, .4889)

99% confidence interval: (.4682, .4918)

To use Calculator  
Follow steps page 492

e. Write an interpretation of your 90% confidence interval.

We are 90% confident that the true ~~mean~~ percentage of teenagers who use cell phones while driving is contained in the interval (.4725, .4875)

f. Write an interpretation of your 90% confidence level.

In future sample we will 90% of sample in the interval .4725, .4875

3. As the level of confidence increases, the interval length widens (narrows/widens/stays the same)

4. As the sample size increases, the interval length narrows (narrows/widens/stays the same)

5. A sample survey found that 79% of 9,132 adults have a landline phone.

a. Approximately how many people in the survey said that they have a landline phone? 7214

b. Do you think that this survey will have more, less or about the same amount of bias as #2? Explain.

*less because people are not as likely to lie about having a landline phone*

c. Find a 90% confidence interval for the true proportion of adults who have a landline phone.

*(.783, .797)*

d. A 95% confidence interval for the survey is found to be (78.2%, 79.8%). Consider the following statements.

- (1) We are 95% certain that between 78.2% and 79.8% of those surveyed have a landline phone.
- (2) We are 95% certain that between 78.2% and 79.8% of all adults have a landline phone.
- (3) If we repeatedly took more samples of 9,132 adults, then we are 95% certain that 79% will be contained in new intervals.
- (4) If we repeatedly took more samples of 9,132 adults, then the true population proportion would be captured in the given interval 95% of the time.
- (5) If we repeatedly took more samples of 9,132 adults, then 95% of all intervals created would capture the true population proportion.

Which of these statements is an appropriate interpretation of this interval? *2*

Which of these statements is an appropriate interpretation of the level? *5*

6. When looking for the sample size for a given margin of error, use *.5* for the sample proportion.

7. When looking for the sample size for a given margin of error, how should the answer be rounded? *Always Round up*

8. Suppose we wish to do a random sample survey with a margin of error of  $\pm 2\%$  at the 90% confidence level. How many people do the pollsters need to interview? Set up an equation and solve.

*Page 493-494*

$$p^*(1-p^*) \left( \frac{z^*}{m} \right)^2 = 1692 \quad n = 1692$$

$$(.5)(.5) \left( \frac{1.645}{.02} \right)^2$$

9. Suppose we wish to do a random sample survey with a margin of error of  $\pm 3.5\%$  at the 99% confidence level. How many people do the pollsters need to interview? Set up an equation and solve.

$$.25 \left( \frac{2.58}{.035} \right)^2 = 1358.44 \quad n = 1359$$

10. Suppose we wish to do a random sample survey with a margin of error of  $\pm 4\%$  at the 95% confidence level. How many people do the pollsters need to interview? Set up an equation and solve.

$$.25 \left( \frac{1.96}{.04} \right)^2 = 600.25 \quad n = 601$$