

1. How many people must be surveyed to estimate a population proportion if you know 25% of a sample answered yes with a 4% margin of error? *and 95% level of confidence*

$$n = \frac{1.96^2 (.25)(.75)}{.04^2}$$

$$n = 451$$

2. A survey of 300 fatal accident showed that 123 were alcohol related. Construct a 98% confidence interval for the true proportion of all accidents that are alcohol related.

$$\hat{p} = \frac{123}{300} = .41$$

$$E = 2.325 \sqrt{\frac{(.41)(.59)}{300}}$$

$$E = 0.066$$

$$.344 < p < .476$$

3. Fifteen SmartCars were randomly selected and the highway mileage of each was recorded. The analysis yielded a mean of 47 miles per gallon and a standard deviation of 5 miles per gallon. Find a 90% confidence interval for the true mean highway mileage of all SmartCars.

$$n = 15$$

$$df = 14$$

$$\bar{x} = 47$$

$$S = 5$$

$$t_{\alpha/2} = 1.761$$

$$E = 1.761 \cdot \frac{5}{\sqrt{15}}$$

$$E = 2.27$$

$$44.73 < \mu < 49.27$$

4. The football coach randomly selected 10 players and timed how long each player took to perform a certain drill. The times (in minutes) were recorded:

13.2 5.1 7.5 8.0 12.7 7.6 13.8 14.5 7.7 10.5

Determine a 95% confidence interval for the mean time for all players.

$$n = 10$$

$$df = 9$$

$$\bar{x} = 10.06$$

$$S = 3.3$$

$$t_{\alpha/2} = 2.262$$

$$E = 2.262 \cdot \frac{3.3}{\sqrt{10}}$$

$$E = 2.36$$

$$7.70 < \mu < 12.42$$

5. In doing market research for the Ford Motor Company, you find that a random sample of 1220 households include 1054 in which a vehicle is owned. Based on those results, construct a 98% confidence interval for the percentage of all households in which a vehicle is owned.

$$\hat{p} = \frac{1054}{1220}$$

$$n = 1220$$

$$E = 2.325 \sqrt{\frac{(.86)(.14)}{1220}}$$

$$\hat{p} = 0.86$$

$$Z_{\alpha/2} = 2.325$$

$$E = .023$$

$$.837 < p < .883$$

6. Construct a ~~98%~~^{90%} confidence interval for the mean income of all full-time workers who have a bachelor's degree. A sample of 25 such workers shows that a distribution of incomes is roughly normal with a mean of \$39,271 and a standard deviation of \$18,933.

$$n = 25$$

$$df = 24$$

$$\bar{x} = 39,271$$

$$S = 18,933$$

$$t_{\alpha/2} = 1.711$$

$$E = 1.711 \cdot \frac{18,933}{\sqrt{25}}$$

$$E = 6,478.87$$

$$32,792.13 < \mu < 45,749.87$$

7. A 90% confidence interval has been constructed for the proportion of American college students who prefer American automobiles is given by $0.322 < p < 0.460$.

a. Based on this interval, do you believe that 21% of all college students prefer American automobiles?

no, .21 is too low as it is outside of the confidence interval

b. What is the best point estimate for the proportion of who prefer American automobiles?

.391

c. What is the margin of error for this confidence interval?

.069

d. What would happen to the point estimate if we increased the level of confidence to 99%?

nothing

e. What would happen to the margin of error if we increased the level of confidence to 99%?

E would increase

8. In a study of the use of hypnosis to relieve pain, sensory ratings were measured for 14 subjects, with the results recorded below. Use these sample data to construct a 95% confidence interval for the mean sensory rating for the population from which the sample was drawn. The data is normally distributed.

8.8	6.6	8.4	7.0	9.0	10.3	8.7
11.3	8.1	5.2	6.3	8.7	6.2	7.9

9. Nielsen Media Research wants to estimate the mean amount of time (in hours) that full-time college students spend watching television each weekday. Find the sample size necessary to estimate that mean with a 0.25 hour margin of error. Assume that a 96% degree of confidence is desired. Also assume that a pilot study showed that a standard deviation is estimated to be 1.97 hours.

$$z_{\alpha/2} = 2.55$$

$$n = \left(\frac{(2.55)(1.97)}{.25} \right)^2$$

$$n = 404$$

10. How many TV households must Nielsen survey to estimate the percentage that are turned to *The Late Show*? Assume that you want 97% confidence that your sample percentage has a margin of error of two percentage points. Also assume that nothing is known about the percentage of households tuned in to any television shows after 11PM

$$z_{\alpha/2} = 2.17$$

$$n = \frac{(2.17)^2 (.25)}{(.02)^2}$$

$$n = 2944$$