15.2.8: Chapter 9 Homework

1. The average number of years of post secondary education for employees within a certain industry is 1.5. A company claims that this average is higher for its employees. A random sample of 16 of its employees has an mean of 2.1 years of post secondary education with a standard deviation of 0.6 years.
   a. Find a 95% confidence interval for the mean number of years of post secondary education for the company's employees. How does this compare with the industry value?
   b. Find a 95% confidence interval for the standard deviation of number years of post secondary education for the company's employees.
2. When polling companies report a margin of error, they are referring to a 95% confidence interval. Go to the website www.pollingreport.com and verify the stated margins of error for 2 polls.
3. In a random sample of five microwave ovens, the mean repair cost was \$75.00, and the sample standard deviation was \$12.50. Construct and interpret a 95% confidence interval for the mean. standard deviation
4. In a random sample of seven computers, the mean repair cost was \$100.00 and the was \$42.50. Construct and interpret a 99% confidence interval for the mean.,
5. You did some research on repair costs of microwave ovens and found that the population standard deviation is $\sigma = \$15$. Repeat Exercise 3, using a normal distribution with the appropriate calculations for a standard deviation that is known. Compare the results.
6. A soccer ball manufacturer wants to estimate the mean circumference of soccer balls within 0.15 inch. Assume that the population of circumferences is normally distributed.
   a. Determine the minimum sample size required to construct a 99% confidence interval for the population mean. Assume the population standard deviation is 0.20 inch.
   b. Repeat part (a) using a standard deviation of 0.10 inch. Which standard deviation requires a larger sample size? Explain.
   c. Repeat part (a) using a confidence level of 95%. Which level of confidence requires a larger sample size? Explain.
7. If all other quantities remain the same, how does the indicated change affect the minimum sample size requirement (Increase, Decrease or No Change)?
   a. Increase in the level of confidence
   b. Increase in the error tolerance
   c. Increase in the standard deviation
8. In a survey of 3,224 U.S. adults, 1515 said flying is the most stressful form of travel. Construct a 95% confidence interval for the proportion of all adults who say that flying is the most stressful form of travel.
9. A study of 2,008 traffic fatalities found that 800 of the fatalities were alcohol related. Find a 99% confidence interval for the population proportion, and explain what it means.
10. In a survey of 1,003 U.S. adults, 662 would be happy spending the rest of their career with their current employer. Construct a 90% confidence interval for the proportion that would be happy staying with their current employer. Does this result surprise you?
11. You wish to estimate, with 95% confidence and within 3.5% of the true population, the proportion of computers that need repairs or have problems by the time the product is three years old.
    a. No preliminary estimate is available. Find the minimum sample size needed.
    b. Find the minimum sample size needed, using a prior study that found that 19% of computers needed repairs or had problems by the time the product was three years old.
    c. Compare the results from parts (a) and (b).
12. A lawn mower manufacturer is trying to determine the standard deviation of the life of one of its lawn mower models. To do this, it randomly selects 12 lawn mowers that were sold several years ago and finds that the sample standard deviation is 3.25 years. Use a 99% level of confidence to find a confidence interval for standard deviation.
13. The monthly incomes of 20 randomly selected individuals who have recently graduated with a bachelor's degree in social science have a sample standard deviation of \$107. Use a 95% level of confidence to find a confidence interval for standard deviation.