

## AE

## Additional Exercises

1. The owner of Sloppy Jack's bar is thinking about installing some video game machines. To estimate the profitability of the machines, he measures the number of times a competitor's machines are played over a randomly selected sample of days. The preliminary sample showed that the standard deviation of the number of times the machines are played is 10 times per day. Find the sample size (in days) necessary to estimate the average number of times the machines will be played in a day to within 5 plays with 99% confidence.
2. A random sample of fifteen eleven-year-old boys is selected in order to estimate the mean height for boys belonging to that age group. The resulting measurements in inches are given in the table below.

Heights (Inches)				
55	58	52	58	54
57	56	54	58	56
52	59	55	61	57

- a. Calculate the sample mean and the sample standard deviation of the heights.
  - b. Construct a 95% confidence interval for the mean height of all eleven-year-old boys.
  - c. What assumption did you make about the heights in constructing your interval?
3. R. Cramden, chief development officer for Fontana Area Transport bus company, is concerned about the declining use of the bus system. He wishes to estimate the percentage of Fontana residents who consider safety a significant factor in their decision about whether or not to ride a bus. This will be a preliminary study so he is willing to develop an estimate with an error of 10% at a confidence level of 90%.
    - a. What sample size will be needed?
    - b. If 150 residents in a random sample of 500 Fontana residents say that they consider safety a significant factor in their decision about whether or not to ride a bus, estimate the true proportion of Fontana residents who think safety is a significant factor in their decision about whether or not to ride a bus with 95% confidence.
  4. According to a 2001 study conducted by the American Stock Exchange, 87% of 500 young Americans surveyed said that they can't count on Social Security as a source of income when they retire. Construct a 90% confidence interval for the proportion of young Americans who feel they can't count on Social Security as a source of income when they retire.
  5. The State Bureau of Standards must inspect gasoline station pumps on a regular basis to be sure they are operating properly. A recent survey of a randomly selected group of 61 pumps produced a sample mean of 9.75 gallons dispensed for a pump reading ten gallons. If the sample had a standard deviation of 1.12 gallons, find the 80% confidence interval for the mean amount of gas dispensed when a gas pump reads ten gallons.
  6. In a population of non-unionized employees, 55% are sympathetic toward unionization. The American Federation of Labor has drawn a random sample of 250 persons selected from this population to investigate union interest. Construct a 90% confidence interval for the proportion of the sample that will be sympathetic toward unionization.

7. Suppose a study designed to collect data on smokers and nonsmokers uses a preliminary estimate of the proportion that smoke of 22%. How large a sample should be taken to estimate the proportion of smokers in the population with a margin of error of 0.02 with 88% confidence?
8. As part of an annual review of its accounts, a discount brokerage firm selects a random sample of 15 customers. Their accounts are reviewed for a total account valuation, which showed a mean of \$32,000 with a sample standard deviation of \$8200.
  - a. What is a 99% confidence interval for the mean account valuation of the population of customers? Interpret the interval in terms of the problem.
  - b. What assumption about the account distribution is necessary to solve this problem?
9. Direct Music has 250 retail outlets throughout the United States. The firm is evaluating a potential location for a new outlet, based in part, on the mean annual income of the individuals in the marketing area of the new location. A sample of size 36 was taken; the sample mean income is \$31,100. The population standard deviation is estimated to be \$4500. Construct a confidence interval using a confidence coefficient of 0.95.
10. Suppose we want to determine the sample size required to give us a 95% confidence interval that estimates, to within \$500, the average salary of a Virginia Tech employee. Also, suppose that from a previous experiment, we know that  $s = \$6300$ . What is the minimum sample size required?
11. A reporter for a student newspaper is writing an article on the cost of off-campus housing. A sample of 16 efficiency apartments within a half-mile of campus resulted in a sample mean of \$650 per month and a sample standard deviation of \$55. Construct a 95% confidence interval estimate of the mean rent per month for the population of efficiency apartments within a half-mile of campus. We will assume that this population is normally distributed.
12. A stock market analyst wants to estimate the average return on a certain stock. A random sample of 15 days yields an average return of 10.37% and a standard deviation of 3.5%. Give a 90% confidence interval for the true average return on the stock. Assume that the stock returns are normally distributed.
13. Voting, Inc. specializes in voter polls and surveys designed to keep political office seekers informed of their position in a race. Using telephone surveys, interviewers ask registered voters who they would vote for if the election were held that day. In a current election campaign, Voting, Inc. has found that 220 registered voters, out of 500 contacted, favor a particular candidate. Find a 95% confidence interval estimate for the proportion of the population of registered voters that favor the candidate.
14. Before beginning a pension program for its workers, a corporation wishes to estimate the proportion of its workers who have been employed at the company for at least 20 years. A random sample of 138 employees yielded 16 who have been with the corporation for at least 20 years. Construct a 92.2% confidence interval for the proportion of employees who have worked for this corporation for at least 20 years. Interpret your results.