7.15

Given a normal distribution with m=100 and **σ -10,** if you select a sample of n=25, what is the probability that **x** is

a. less than 95?

b. between 95 and 97.5?

c. above 102.2?

d. There is a 65% chance that X is above what value?

7.21

Time spent using e-mail per session is normally distributed, with m = 8 minutes and **σ =2** minutes. If you select a random sample of 25 sessions,

a. what is the probability that the sample mean is between 7.8 and 8.2 minutes?

b. what is the probability that the sample mean is between 7.5 and 8 minutes?

c. If you select a random sample of 100 sessions, what is the probability that the sample mean is between 7.8 and 8.2 minutes?

d. Explain the difference in the results of (a) and (c).

7.27

You plan to conduct a marketing experiment in which students are to taste one of two different brands of soft drink. Their task is to correctly identify the brand tasted. You select a random sample of 200 students and assume that the students

have no ability to distinguish between the two brands. (Hint: If an individual has no ability to distinguish between the two soft drinks, then the two brands are equally likely to be selected.)

a. What is the probability that the sample will have between 50% and 60% of the identifications correct?

b. The probability is 90% that the sample percentage is contained within what symmetrical limits of the population percentage?

c. What is the probability that the sample percentage of correct identifications is greater than 65%?

d. Which is more likely to occur—more than 60% correct identifications in the sample of 200 or more than 55% correct identifications in a sample of 1,000? Explain.

7.45

The fill amount of bottles of a soft drink is normally distributed, with a mean of 2.0 liters and a standard deviation of 0.05 liter. If you select a random sample of 25 bottles, what is the probability that the sample mean will be

a. between 1.99 and 2.0 liters?

b. below 1.98 liters?

c. greater than 2.01 liters?

d. The probability is 99% that the sample mean amount of soft drink will be at least how much?

e. The probability is 99% that the sample mean amount of soft drink will be between which two values (symmetrically distributed around the mean)?

8.1

If **X = 85, σ = 8,** and n = 64, construct a 95% confidence interval estimate for the population mean, m

8.9

The manager of a paint supply store wants to estimate the actual amount of paint contained in 1-gallon cans purchased from a nationally known manufacturer. The manufacturer’s specifications state that the standard deviation of the amount of paint is equal to 0.02 gallon. A random sample of 50 cans is selected, and the sample mean amount of paint per 1-gallon can is 0.995 gallon.

a. Construct a 99% confidence interval estimate for the population mean amount of paint included in a 1-gallon can.

b. On the basis of these results, do you think that the manager has a right to complain to the manufacturer? Why?

c. Must you assume that the population amount of paint per can is normally distributed here? Explain.

d. Construct a 95% confidence interval estimate. How does this change your answer to (b)?

8.15A stationery store wants to estimate the mean retail

value of greeting cards that it has in its inventory. A random

sample of 100 greeting cards indicates a mean value of

$2.55 and a standard deviation of $0.44.

a. Assuming a normal distribution, construct a 95% confidence interval estimate for the mean value of all greeting cards in the store’s inventory.

b. Suppose there were 2,500 greeting cards in the store’s inventory. How are the results in (a) useful in assisting the store owner to estimate the total value of the inventory?

8.29

CareerBuilder.com surveyed 1,124 mothers who were currently employed full time. Of the women surveyed, 281 said that they were dissatisfied with their work–life balance, and 495 said that they would take a pay cut to spend more time with their kids (data extracted from D. Jones, “Poll Finds Resentment of Flextime,” www.usatoday.comMay 11, 2007).

a. Construct a 95% confidence interval estimate for the population proportion of mothers employed full time who are dissatisfied with their work–life balance.

b. Construct a 95% confidence interval estimate for the

population proportion of mothers employed full time who would take a pay cut to spend more time with their kids.

c. Write a short summary of the information derived from (a) and (b).

8.37

If you want to be 95% confident of estimating the population proportion to within a sampling error of and there is historical evidence that the population proportion is approximately 0.40, what sample size is needed?

8.47

In a study of 500 executives, 315 stated that their company informally monitored social networking sites to stay on top of information related to their company (data

extracted from “Checking Out the Buzz,” USA Today, June 26, 2009, p. 1B).

a. Construct a 95% confidence interval for the proportion of companies that informally monitored social networking sites to stay on top of information related to their company.

b. Interpret the interval constructed in (a).

c. If you wanted to conduct a follow-up study to estimate the population proportion of companies that informally monitored social networking sites to stay on top of information related to their company to within with 95% confidence, how many executives would you survey?

8.69

The real estate assessor for a county government wants to study various characteristics of single-family houses in the county. A random sample of 70 houses reveals the following:

• Heated area of the houses (in square feet): X= 1,759, *S=* 380.

• 42 houses have central air-conditioning.

a. Construct a 99% confidence interval estimate for the population mean heated area of the houses.

b. Construct a 95% confidence interval estimate for the population proportion of houses that have central air conditioning.

8.79

A quality characteristic of interest for a tea-bag- filling process is the weight of the tea in the individual bags. In this example, the label weight on the package indicates that the mean amount is 5.5 grams of tea in a bag. If the bags are under filled, two problems arise. First, customers may not be able to brew the tea to be as strong as

they wish. Second, the company may be in violation of the truth-in-labeling laws. On the other hand, if the mean amount of tea in a bag exceeds the label weight, the com-

pany is giving away product. Getting an exact amount of tea in a bag is problematic because of variation in the tem- perature and humidity inside the factory, differences in the density of the tea, and the extremely fast filling operation of the machine (approximately 170 bags per minute). The following data (stored in ) are the weights, in grams, of a sample of 50 tea bags produced in one hour by a single machine:

5.65 5.44 5.42 5.40 5.53 5.34 5.54 5.45 5.52 5.41

5.57 5.40 5.53 5.54 5.55 5.62 5.56 5.46 5.44 5.51

5.47 5.40 5.47 5.61 5.53 5.32 5.67 5.29 5.49 5.55

5.77 5.57 5.42 5.58 5.58 5.50 5.32 5.50 5.53 5.58

5.61 5.45 5.44 5.25 5.56 5.63 5.50 5.57 5.67 5.36

a. Construct a 99% confidence interval estimate for the population mean weight of the tea bags.

b. Is the company meeting the requirement set forth on the label that the mean amount of tea in a bag is 5.5 grams?

c. Do you think the assumption needed to construct the confidence interval estimate in (a) is valid?