1. Last year, at Northern Manufacturing Company, 200 people had colds during the year. One hundred fifty-five people who did no exercising had colds, while the remainder of the people with colds were involved in a weekly exercise program. Half of the 1,000 employees were involved in some type of exercise.

a. What is the probability that an employee will have a cold next year?

b. Given that an employee is involved in an exercise program, what is the probability that he or she will get a cold?

c. What is the probability that an employee that is not involved in an exercise program will get a cold next year?

d. Are exercising and getting a cold independent events? Explain your answer.

2. Fast Service Store has maintained daily sales records on the various size “Cool Drink” sales. These are shown in the following table:

“Cool Drink” Price Number Sold

$0.25 75

$0.35 120

$0.50 125

$0.75 50

a. Set up a probability distribution for “Cool Drink” sales.

b. What is the expected value of this probability distribution?

3. Martin Manufacturing produces cases for personal computers and other electronic equipment. The quality control inspection procedure is to select 6 items, and if there are 0 or 1 defective cases in the group of 6, the process is said to be in control. If the number of defects is more than 1, the process is out of control. Suppose that the true proportion of defective items is 0.15.

a. What is the probability that there will be 0 or 1 defects in a sample of 6 (i.e., that the process is in control)?

b. What is the probability that there will be more than 1 defect in a sample of size 6 (i.e., that the process is out of control)?

c. What is the probability that there will be exactly 2 defects in a sample of size 6?

5. A nationwide real estate company claims that its average time to sell a home is 57 days. Suppose it is known that the standard deviation of selling times is 12.3 days and that selling times are normally distributed.

a. Assuming the company’s claim is true, if one home is selected at random, what is the probability that it will be sold in less than 63 days?

b. Assuming the company’s claim is true, if a random sample of 9 homes is selected, what is the probability that the mean selling time will be less than 63 days?

c. Assuming the company’s claim is true, if a random sample of 64 homes is selected, there is a 75% probability that the sample mean is greater than how many days?

d. Do you have to know that selling times are normally distributed to answer part (c)? Explain why or why not.

e. Suppose you doubt the company’s claim that their average selling time is 57 days. To test their claim, you select a random sample of 64 homes and the sample mean number of days to sell those homes is 62 days. Do you have evidence to refute the company’s claim? Explain why or why not.

7. The start of the twenty-first century saw many corporate scandals and many individuals losing faith in business. In a 2007 poll conducted by the New York City-based Edelman Public Relations firm, 57% of respondents say they trust business to “do what is right.” This percentage was the highest in the annual survey since 2001.

a. If the sample size is 100, construct a 95% confidence interval estimate of the population proportion of individuals who trust business to “do what is right.”

b. If the sample size is 200, construct a 95% confidence interval estimate of the population proportion of individuals who trust business to “do what is right.”

c. Based on the results of part (a), can you conclude that more than half of the respondents trust business to “do what is right”? Explain your answer.

d. Based on the results of part (b), can you conclude that more than half of the respondents trust business to “do what is right”? Explain your answer.

e. Discuss the effect that sample size has on the width of confidence intervals.

8. Suppose that it is a presidential election year and Ohio is one of the “swing” states. Your polling company wants to conduct a presidential preference poll of the citizens of Ohio to predict which candidate will win the election.

a. How many voters must be polled to be 95% confident of your results within +/- 3%?

b. How many voters must be polled to be 95% confident of your results within +/- 2%?

c. How many voters must be polled to be 95% confident of your results within +/- 1%?

d. Discuss the effect of margin of error on sample size.