1. A consumer watchdog organization estimates the mean weight of 1-ounce "Fun-Size" candy bars to see if customers are getting full value for their money. A random sample of 25 bars is selected and weighed, and the organization reports that a 90% confidence interval for the true mean weight of the candy bars is 0.992 to 0.998 ounces.

(a) What is the point estimate from this sample?

(b) What is the margin of error?

(c) Interpret the 90% confidence *interval* 0.992 to 0.998 in the context of the problem.

(d) Interpret the confidence *level* of 90% in the context of the problem.

2. A university health services physician is concerned about how much sleep freshman are getting in the first few months of school. She asks a simple random sample of 20 students how much sleep they got the previous night and constructs a 95% confidence interval for the mean amount of sleep in hours.

(a) Discuss whether this study meets the necessary conditions for constructing a confidence interval. If you think one of the conditions has not been met, what additional information would be required or what change in the study would you recommend?

(b) If, instead of constructing a 95% confidence interval, the physician constructed a 90% confidence interval, would the 90% interval be wider, narrower, or the same width as the 95% interval? Explain.

(c) How would the width of confidence interval change if the physician took a larger sample? Explain.

1. Suppose you know that the distribution of finishing times for a certain crossword puzzle has a mean of 25 minutes, a standard deviation of 8 minutes, and is moderately skewed left. You take an SRS of 45 finish times from this distribution and calculate the mean finish time, $\bar{x}$.

(a) Describe the shape, center, and spread of the sampling distribution of $\bar{x}$.

(b) Find a number, *k*, such that 95% of the values in the sampling distribution will lie within *k* minutes of the mean of the distribution.

(c) If you take repeated samples of size 45 from this population, what proportion of the time will the interval $\bar{x} \pm k$ contain the number 25? Explain.

2. The confidence level is sometimes called the "capture rate." Explain why this is an appropriate term.

3. An insect ecologist reports a 95% confidence interval for the mean length of full-grown aquatic larvae of the Phantom Midge *Chaoborus albatus* to be 6.9 to 8.5 mm, based on a sample of 9 individual larvae.

(a) What are the point estimate and margin of error associated with this confidence interval?

(b) The ecologist stated that "all necessary conditions for constructing this confidence interval were met." What does this tell you about his methods and about the population of insect larvae?

(c) If the ecologist had reported a 99% confidence interval instead of a 95% interval, how would it have been different? Explain.

(d) The ecologist was unhappy with how wide this interval was. What should he do to produce a narrower interval with the same level of confidence? Explain.

