Chapter 1: Introduction to Statistics

1. a. The population is the entire set of adolescent boys.
   b. The sample is the group of 30 boys who were tested in the study.

2. A parameter is a characteristic, usually a numerical value, that describes a population. A statistic is a characteristic, usually numerical, that describes a sample.

3 Descriptive statistics are used to simplify and summarize data. Inferential statistics use sample data to make general conclusions about populations.

4. a. If treatments 1 and 2 affect individuals differently, then the scores in the first sample will be different from the scores in the second sample.
   b. Even if the two treatments have exactly the same effect, you do not expect the individuals in one condition to behave exactly the same as the individuals in the other treatment. The two groups will produce different scores with different means. In this case, the differences are the result of sampling error.

5. A correlational study has only one group of individuals and measures two different variables for each individual. Other research evaluating relationships between variables compares two (or more) different groups of scores.

6. The goal of an experiment is to demonstrate the existence of a cause and effect relationship between two variables. To accomplish the goal, an experiment must manipulate an independent variable and control other, extraneous variables.

7. The independent variable is holding a pen in your teeth versus holding the pen in your lips. The dependent variable is the rating given to each cartoon.

8. This is not an experiment because no independent variable is manipulated. They are comparing two preexisting groups of individuals.

9. This is a correlational study. The researcher is simply observing, not manipulating, two variables.

10. This is an experiment. The researcher is manipulating the amount of caffeine consumed by each child.

11. This is not an experiment because there is no manipulation. Instead, the study is comparing two preexisting groups (American and Canadian students).
12. The independent variable is the substance that is inhaled, either oxytocin or the inactive placebo. The dependent variable is whether or not the people were willing to give their money to the trustee.

13. A discrete variable exists as indivisible categories such as the number of children in a family. For a continuous variable the categories are infinitely divisible such as a one-inch interval on a ruler, which can be divided in half, in quarters, in eighths, and so on.

14. a. An ordinal scale provides information about the direction of difference (greater or less) between two measurements.
   b. An interval scale provides information about the magnitude of the difference between two measurements.
   c. A ratio scale provides information about the ratio of two measurements.

15. a. The independent variable is humorous versus nonhumorous.
   b. The independent variable is measured on a nominal scale.
   c. The dependent variable is the number of sentences recalled.
   d. The dependent variable is measured on a ratio scale.

16. A hypothetical construct is an internal attribute or characteristic that cannot be observed directly. Because constructs cannot be directly observed or measured, researchers must find some indirect method for measuring and defining them so that constructs can be examined in research studies. An operational definition provides an indirect method for measuring and defining a construct.

17. a. The independent variable is whether or not the rats receive the antioxidant supplements, and the dependent variable is amount of time needed to find the submerged platform.
   b. Time is measured on a ratio scale.

18. a. $\Sigma X = 16$
   b. $\Sigma X^2 = 66$
   c. $(\Sigma X)^2 = (16)^2 = 256$
   d. $\Sigma (X - 1) = 11$

21. a. $\Sigma X = 22$
   b. $\Sigma Y = 20$
   c. $\Sigma XY = 79$

19. a. $\Sigma X = 11$
   b. $\Sigma X^2 = 45$
   c. $\Sigma (X + 1) = 15$
   d. $\Sigma (X + 1)^2 = 71$

22. a. $\Sigma (X + 1)$
   b. $\Sigma (X + 1)^2$
   c. $(\Sigma X)^2 - 3$

20. a. $\Sigma X = 0$
   b. $\Sigma X^2 = 36$
   c. $\Sigma (X + 3) = 15$

23. a. $\Sigma X^2 = 80$
   b. $(\Sigma X)^2 = 144$
   c. $\Sigma (X - 3) = 0$
d. $\Sigma (X - 3)^2 = 44$