

## Basic Principles of Statistics

Data from a medical study contains values of many variables for each of the people who were the subjects of the study. Which of the following variables are categorical and which are quantitative?

- |           |                            |                                  |
|-----------|----------------------------|----------------------------------|
| 1- Gender | 2- Age                     | 3- Race                          |
| 4- Smoker | 5- Systolic blood pressure | 6- Level of calcium in the blood |

For each bold number in the following descriptions, circle it if it is a statistic and underline it if it is a parameter.

- 7- A carload lot of ball bearings has mean diameter **2.5003** centimeters. This is within the specifications for acceptance of the lot by the purchaser. By chance, an inspector chooses 100 bearings from the lot that have mean diameter **2.5009** cm. Because this is outside the specified limits, the lot is mistakenly rejected.
- 8- The Bureau of Labor Statistics last month interviewed 60,000 members of the US labor force, of whom **7.2%** were unemployed.
- 9- A telemarketing firm in Los Angeles uses a device that dials residential telephone numbers in that city at random. Of the first 100 numbers dialed, **48%** are unlisted. This is not surprising because **52%** of all Los Angeles residential phones are unlisted.
- 10- A researcher carries out a randomized comparative experiment with young rats to investigate the effects of a toxic compound in food. She feeds the control group a normal diet. The experimental group receives a diet with 2500 parts per million of the toxic material. After 8 weeks, the mean weight gain is **335** grams for the control group and **289** grams for the experimental group.

An administrator at a large university wants to conduct a survey to estimate the proportion of students who are satisfied with the appearance of the university buildings and grounds. The administrator is considering several methods of obtaining a sample of 500 students from the 70,000 students at the university.

- 11- The first method the administrator is considering consists of taking a sample from a very large number of students who will attend the first football game of the season. The first 500 students who enter the football stadium could be used as a sample.
- Does this sampling method create a representative group? Why or Why not?
  - Will the sample proportion of the students underestimate, overestimate, or be approximately the same as the actual population proportion? Explain your answer.

12- The second method the administrator is considering consists of using a computer to randomly select 500 names from a list of the 70,000 students.

- a. Does this sampling method create a representative group? Why or Why not?
  
  
  
  
  
  
  
  
  
  
- b. Will the sample proportion of the students underestimate, overestimate, or be approximately the same as the actual population proportion? Explain your answer.

13- An online advertisement firm is interested in determining how much time on average people spend online each week.

- a. What type of study should they conduct? Explain.
  
  
  
  
  
  
  
  
  
  
- b. How might randomization be used in the design of the study you have selected?

14- For a class project, a student wants to study the likelihood that students turn in their homework each day.

- a. What type of study should they conduct? Explain.
  
  
  
  
  
  
  
  
  
  
- b. How might randomization be used in the design of the study you have selected?

15- A psychologist is interested in determining whether meditation can reduce anxiety. The study can last for a month's time.

- a. What type of study should they conduct? Explain.
  
  
  
  
  
  
  
  
  
  
- b. How might randomization be used in the design of the study you have selected?