

- 15.5. Give an example of an experiment where a control group would not be necessary.
- 15.6. Five treatments ( $T_1, T_2, T_3, T_4, T_5$ ) are to be studied in a randomized complete block design with four blocks. Obtain the randomized assignments of treatments to experimental units.
- 15.7. In a study to evaluate the quality of three alternative recipes for salsa, six containers of salsa—two from each of the three recipes—were randomly assigned to six taste panels. Each taste panel consisted of a team of four trained taste-testers. Each panel reached a consensus score for the assigned recipe. What is the experimental unit in this study? Why?
- 15.8. Three high schools participated in a study to evaluate the effectiveness of a new computer-based mathematics curriculum. In each school, four 24-student sections of freshman algebra were available for the study. The two types of instruction (standard curriculum, computer-based curriculum) were randomly assigned to the four sections in each of the three schools. At the end of the term, a standard mathematics achievement test was given to each of the 24 students in each section.
- Is this study experimental, observational, or mixed experimental and observational? Why?
  - Identify all factors, factor levels, and factor-level combinations.
  - What type of study design is being implemented here?
  - What is the basic unit of study?
- \*15.9. An economist compiled data on productivity improvements last year for a sample of firms producing electronic computing equipment. The firms were classified according to the level of their average expenditures for research and development in the past three years (low, moderate, high).
- Is this study experimental, observational, or mixed experimental and observational? Why?
  - Identify all factors, factor levels, and factor-level combinations.
  - What type of study design is being implemented here?
  - What is the basic unit of study?
- 15.10. In a study to investigate the effect of color of paper (blue, green, orange) on response rates for questionnaires distributed by the “windshield method” in supermarket parking lots, four supermarket parking lots were chosen in a metropolitan area and 10 questionnaires of each color were assigned at random to cars in the parking lots.
- Is this study experimental, observational, or mixed? Why?
  - Identify all factors, factor levels, and factor-level combinations.
  - What type of study design is being implemented here?
  - What is the basic unit of study?
- 15.11. A rehabilitation center researcher was interested in examining the relationship between physical fitness prior to surgery of persons undergoing corrective knee surgery and the time required in physical therapy until successful rehabilitation. Data on the number of days required for successful completion of physical therapy and the prior physical fitness status (below average, average, above average) were collected.
- Is this study experimental, observational or mixed? Why?
  - Identify all factors, factor levels, and factor-level combinations.
  - What type of study design is being implemented here?
  - What is the basic unit of study?
- 15.13. An automotive engineer was interested in the effect of four alternative rubber compounds on the life of automobile tires. To carry out the study, five tires were manufactured from each of the four compounds and five automobiles were obtained for testing. With each automobile, the four tire types were assigned at random to the four wheels. Each automobile was driven for 40,000 miles and the amount of wear on each of the four tires was recorded.
- What type of study is this, experimental, observational, or mixed? Why?
  - What is the basic unit of study?
  - What factors and factor levels are being studied here?
  - What type of study design is being implemented here?
  - Suppose that six compounds were under study instead of four. What type of study design is suggested?