



**13-2** - *continued*

- (b) A pollster reports that 40% of the 315 shoppers surveyed at the Newtown Shopping Center last week come to the center more than once each week.
  
- (c) The average speed for the 200 selected automobiles traveling on the portion of the expressway in front of the Newtown Shopping Center in the last three days is reported to be 52.4 mph.
  
- (d) Based on a survey conducted on 315 shoppers at the Newtown Shopping Center last week, a pollster reports that about 40% of the regular shoppers come to the shopping center more than once each week.

**13-3** Decide whether or not each sampling procedure is truly simple random sampling.

- (a) In order to select a sample 25 accounts from a file containing 203 accounts, each account is first coded with a three-digit number using only digits from 1 to 6 (i.e., 111 to 116, 121 to 126, 131 to 136, etc.) Then, three regular six-sided dice are rolled: one red, one blue, one yellow. The account having the label whose first digit corresponds to the red die, whose second digit corresponds to the blue die, and whose third digit corresponds to the yellow die is selected. This is repeated until 25 accounts are selected.
  
- (b) A sample of households from a city is selected by having several individuals drive through different parts of the city selecting any house that catches the driver's eye every half hour.

**13-4** Decide whether or not each sampling procedure is truly simple random sampling.

(a) A sample of households from a city is selected by first labeling each of the 896 city blocks with the integers 001, 002, ..., 896. Then, a random number table is used to select 20 city blocks, and all the households in each selected city block are included in the sample.

(b) A sample of households from a city is selected by first labeling each of the 36,784 households in the city with the integers 00001, 00002, ..., 36784. Then, a random number generator on a computer is used to select 1000 households.

**13-5** A sample of students is to be selected from rosters consisting of 435 names.

(a) Describe how the students would be labeled in order to use a random number table to select a simple random sample of  $n = 15$  students. Then, indicate which labels would be selected for the sample, if we were to read the first three digits of each set of five digits in the 21st row of the second page of Table A.1.

(b) Describe how a systematic random sample of  $n = 15$  students would be obtained.

(c) Describe how a systematic random sample of  $n = 10$  students would be obtained.

**13-6** A sample of subjects is to be selected from a list of 30 names.

(a) Describe how the subjects would be labeled in order to use a random number table to select a simple random sample of  $n = 5$  subjects. Then, indicate which labels would be selected for the sample, if we were to read the first two digits of each set of five digits in the 26th row of the first page of Table A.1.

(b) Describe how a systematic random sample of  $n = 5$  subjects would be obtained.

(c) Describe how a systematic random sample of  $n = 4$  subjects would be obtained.

**13-7** The average age of licensed drivers in a state is to be estimated by selecting a sample of driver's licenses. For each sampling frame described, decide if one is more likely, just as likely, or less likely to obtain a good representation of the population with systematic random sampling as with simple random sampling, and explain why.

(a) The sampling frame is a list of driver's licenses ordered alphabetically by last name.

**13-7** - *continued*

- (b) The sampling frame is a list of driver's licenses first ordered by date of birth, then ordered alphabetically by last name.
  
  
  
  
  
  
  
  
  
  
- (c) The sampling frame is a list of driver's licenses ordered by year of the auto primarily driven, then ordered by date of birth.

**13-8** The average age of automobiles on the road in a state is to be estimated by selecting a sample of automobile registrations. Decide if one is more likely, just as likely, or less likely to obtain a good representation of the population with systematic random sampling as with simple random sampling, and explain why, in each situation.

- (a) The sampling frame is a list of automobiles ordered alphabetically by owner's last name.
  
  
  
  
  
  
  
  
  
  
- (b) The sampling frame is a list of automobiles first ordered alphabetically by make of the automobile, then ordered by year of the automobile.
  
  
  
  
  
  
  
  
  
  
- (c) The sampling frame is a list of automobiles first ordered by year of the automobile, then ordered alphabetically by make of the automobile.

**13-9** A spinning wheel is divided into ten equal parts displaying the digits 0 through 9. When spun, the wheel has an equal chance of stopping with each of the ten digits on top.

(a) Suppose 100 digits are selected by spinning the wheel; describe the shape you would expect a histogram displaying the results to have.

(b) Now suppose a set of 10 digits is selected by spinning the wheel, and this is repeated until 100 sets, each set containing 10 digits, are obtained; next, the average for each set of 10 digits is computed. Describe the shape you would expect a histogram displaying the resulting averages to have.

**13-10** Each of the integers from 1 to 6 is painted on one of the sides of a fair, six-sided die. When the die is rolled, each of the six integers is equally likely to be facing up.

(a) Suppose 100 integers are selected by rolling the die; describe the shape you would expect a histogram displaying the results to have.

(b) Now suppose a set of 10 integers is selected by rolling the die, and this is repeated until 100 sets, each set containing 10 integers, are obtained; next, the average for each set of 10 integers is computed. Describe the shape you would expect a histogram displaying the resulting averages to have.