

Answer all questions using complete sentences.

1. In your own words, explain the meanings of the terms *random numbers* and *random samples*.

Random numbers are values generated/picked at random to meet your criteria.

Random samples follow a very specific set of criteria to obtain a sample.

2. Why are random samples so important in statistics?

They allow for a wider range of responses to prevent a biased sample.

3. Marcie conducted a study of the cost of breakfast cereal. She recorded the costs of several boxes of cereal. However, she neglected to take into account the number of servings in each box. Someone told her not to worry because she just had some sampling error. Comment on that advice.

The advice is wrong. A sampling error accounts only for the difference in results based on the use of a sample rather than of the entire population.

4. In a random sample of 50 students from a large university, all the students were between 18 and 20 years old. Can we conclude that the entire population of students at the university is between 18 and 20 years old? Explain.

No, even though the sample is random, some students younger than 18 or older than 20 may have been included in the sample.

5. Greg took a random sample of size 100 from the population of current season ticket holders to State College men's basketball games. Then he took a random sample of size 100 from the population of current season ticket holders to State College women's basketball games.
- a. What sampling technique (stratified, systematic, cluster, multistage, convenience, random) did Greg use to sample from the population of current season ticket holders to all State College basketball games played by either men or women?

stratified

- b. Is it appropriate to pool the samples and claim to have a random sample of size 200 from the population of current season ticket holders to all State College home basketball games played either by men or women? Explain.

No, because each pooled sample would have 100 season ticket holders for men's and women's basketball games. Samples for 125 men's and 75 women's are not possible.

6. Use a random-number table to get a list of eight random numbers from 1 to 976. Explain your work.

Using groups of three digits 001 through 976

Block 4, Row 3

57888 85846 67967 07835 11314

578, 888, 584, 667, 967, 078, 351, 131

7. How do colds affect analytical thinking performance? Results of a study conducted by McGraw and Schleser were reported in *Psychology Today*. The study showed that under certain condition, persons with colds do better than their healthy colleagues. The study considered 62 subjects: 40 healthy men and women and 22 suffering from colds or flu. A key component in this study was the formation of two groups of equal size from the 62 participants, with each group containing both healthy and sick participants.

- a. Describe how you could take the 40 healthy subjects and randomly divide them into two groups of equal size using the random-number table.

Assign distinct numbers to subjects and use a random-number table.

Group assignment methods will vary.

- b. Repeat part (a) for the 22 sick subjects.

Same process as in part (a).

- c. How would you combine the groups of healthy and sick subjects found in parts (a) and (b) to form two groups of equal size so that each group contained both healthy and sick subjects?

The first 20 healthy subjects would be combined with the 2nd group of 11 sick subjects.

8. Suppose there are 30 people at a party. Do you think any two share the same birthday? Let's use the random-number table to simulate the birthdays of the 30 people at the party. Ignoring leap year, let's assume that the year has 365 days. Number the days, 1 representing January 1, 2 representing January 2, and so forth, with 365 representing December 31. Draw a random sample of 30 days (with replacement). These days represent the birthdays of the people at the party. Were any two of the birthdays the same?

Numbers 001 through 365

Block 2 row 1, and search through 30 3-digit numbers

9. An important part of employee compensation is a benefits package, which might include health insurance, life insurance, child care, vacation days, retirement plan, parental leave, bonuses, etc. Suppose you want to conduct a survey of benefits packages available in private businesses in Hawaii. You want a sample size of 100. Some sampling techniques are described below. Categorize each techniques as *simple random sample*, *stratified sample*, *systematic sample*, *cluster sample*, or *convenience sample*.

- a. Assign each business in the Island Business Directory a number, then use a random-number table to select the businesses to be included in the sample.

Simple random sample.

- b. Use postal ZIP Codes to divide the state into regions. Pick a random sample of 10 ZIP Code areas and then include all the businesses in each selected ZIP Code area.

Cluster sample

- c. Send a team of five research assistants to Bishop Street in Downtown Honolulu. Let each assistant select a block and interview an employee from each business found. Each researcher can have the rest of the day off after getting responses from 20 different businesses.

Convenience sample

- d. Use the Island Business Directory. Number all the businesses. Select a starting place at random, and then use every 50th business listed until you have 100 businesses.

Systematic sample

- e. Group the businesses according to type: medical, shipping, retail, manufacturing, financial, construction, restaurant, hotel, tourism, other. Then select a random sample of 10 businesses from each business type.

Stratified sample