

1.
 - a. Name one way that a cluster random sample is the same as a stratified random sample.
 - b. Name one way that a cluster random sample is different from a stratified random sample.
2. At a certain high school, every student is required to take an English class each year (English 9 for freshman, English 10 for sophomores, English 11 for juniors, and English 12 for seniors). They are also required to take a physical education class each year (Wellness, Team Sports, Individual Sports, and Personal Fitness -- with multiple grade levels in each class). The high school counselor wants to use a cluster random sample to estimate the proportion of students who have their driver's licenses.
 - a. Should the counselor use the English classes or the physical education classes as the clusters? Explain.
 - b. What is one advantage of using a cluster random sample compared to a simple random sample?
3. Each Major League Baseball (MLB) team is allowed to have 26 players on their roster for opening day. With 30 MLB teams, this means there are 780 players on the opening day rosters. An avid baseball fan wants to select a random sample of these players.
 - a. Describe a method for selecting a simple random sample of 100 players.
 - b. Describe a method that could be used to select a stratified random sample of 90 players.
 - c. Describe a method that could be used to select a cluster random sample of 78 players.
 - d. Describe a method that could be used to select a systematic random sample of 78 players.

4. Zillow wants to estimate the average value for houses in Chicago, which has 178 official neighborhoods. To do this, they will select a random sample of houses in the city and send an inspector to each house to find its value.

Option 1: Select a random sample of 5 homes from each of the neighborhoods.

Option 2: Select a random sample of 5 neighborhoods and visit every house in the selected neighborhoods.

a. Name the sampling method used in Option 1. Give one advantage of using this sampling method.

b. Name the sampling method used in Option 2. Give one advantage of using this sampling method.

c. Which method is more likely to produce better estimates for the true average house value in Chicago?

5. The Gallup organization conducts surveys to find out public opinion on a variety of current topics. They often use complex methods to select their samples. Suppose they are considering four different sampling methods for estimating the President's job approval rating. For each of the following sampling methods, create a dotplot which represents the estimates from 10 simulated samples. Suppose that the actual job approval rating of the President is 45%.

- a. A method with low bias and low variability.
- b. A method with low bias and high variability.
- c. A method with high bias and low variability.
- d. A method with high bias and high variability.

6. A small western town is split in two, divided in half by a river that runs through the middle of the town. The local chamber of commerce wants to survey residents about a proposal to shut down the fish hatchery on the outskirts of town. The chamber of commerce will select one side of town and survey every 5th house. Then the chamber will go to the other side of town and survey every 5th house. Which of the following is the best description of the type of sample the chamber will select?
- A) Simple random sample
 - B) Convenience sample
 - C) Systematic random sample
 - D) Cluster sample
7. A large high school hosts a “freshmen orientation” day before school starts to introduce new students to the school. During freshmen orientation, students are placed into groups of eight freshmen and two seniors who act as leaders. Groups do activities throughout the day to get to know each other. A random sample of 3 groups was taken and each individual in the group – freshman and seniors – were surveyed. Which of the following statements about the sample of 30 is true?
- A) It is a systematic random sample because the students were systematically divided into groups of 8 freshmen.
 - B) It is a cluster random sample because some of the students were selected from each group.
 - C) It is a stratified random sample because some of the students were selected from each group.
 - D) It is a cluster random sample because all of the students were surveyed from the randomly selected groups.