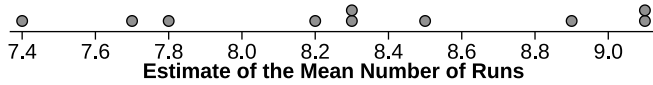


1. A local Amazon distribution center delivers products to three different states: Illinois, Michigan, and Ohio. There were 14,500 purchases delivered from this distribution center on one day. Amazon wants to send a customer service survey to a sample of 100 customers who got one of these deliveries.
 - a. Describe a method for selecting a simple random sample.
 - b. Is it possible that there are no customers from Michigan in the simple random sample of 100 customers? Explain.
 - c. How could Amazon ensure that customers from all three states are represented in the survey? Explain.
2. A high school principal for a small high school of 400 students wants to survey students about a new proposed requirement that athletes must maintain perfect school attendance in order to continue to participate in sports. She decides to select a stratified random sample of 40 students.
 - a. Would it be better to stratify by grade level or by whether or not students are athletes? Explain.
 - b. Describe the process for selecting the stratified random sample.
3. A large fast-food restaurant has a total of 150 employees. There are 120 employees paid hourly and 30 employees on management salary. The owner of the restaurant wants to select a sample of 20 employees to attend a team meeting.
 - a. Describe one potential issue with selecting an SRS of 20 employees.
 - b. Suppose the owner decides to take a stratified random sample by selecting an SRS of 10 hourly wage employees and an SRS of 10 management salary employees. Are the employees within each group homogeneous or heterogeneous? Explain.
 - c. The owner realizes that using equal-sized groups for the hourly wage employees and management salary employees is not representative of all employees. What sample sizes should be used for each group in order for the stratified random sample to be representative of all employees?
4. The Bureau of Labor Statistics uses a complex sampling method to estimate the overall unemployment rate every month. The sampling method has low bias and low variability for estimating the unemployment rate.
 - a. What is meant by low bias?
 - b. What is meant by low variability?

5. For a recent season of major league baseball, Miguel wants to estimate the average number of total runs scored per game. He plans to take an SRS of 20 games and use the mean of the sample as the estimate.

The simulation results below display 10 sample means from 10 separate simple random samples of 20 games each.



- a. Based on the dotplot, estimate the true mean number of runs scored per game. Explain your reasoning.
- b. Miguel realized that American League teams tended to score more runs than National League teams during this season, possibly due to the use of designated hitters. He decides to combine separate simple random samples, one from each league, to form a stratified random sample. Draw a dotplot that could represent the distribution of estimates for 10 simulations using a stratified random sample.
6. Which of the following is NOT true for stratified random sampling?
- A) An SRS is taken from each stratum.
 - B) Individuals within each stratum are homogenous based on some characteristic.
 - C) Every possible sample of size n from the population has an equal chance of being selected.
 - D) Individuals cannot belong to multiple strata.
7. A research company is interested in estimating the mean number of minutes people spend on social media apps. A random sample will be selected from each of four strata: children (12 – 17 years old), young adults (18 – 30 years old), middle-aged adults (31 – 45 years old), and older adults (above 45 years old). Selected individuals will be asked the number of minutes they spend on social media apps on a typical day. Why is stratification used in this situation?
- A) To remove bias when estimating the proportion of individuals in each age range
 - B) To decrease variability in the estimate of the mean time spent on social media apps
 - C) To reduce bias when estimating the mean time spent on social media apps
 - D) To decrease variability in the estimate of the proportion of individuals in each age range