Sampling Distributions

8.5

Who uses this?

Pollsters use different survey methods to accurately reflect public opinion.

Lesson Objective(s):

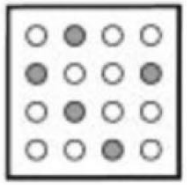
- Estimate population means and proportions and develop margin of error from simulations involving random sampling.
- Analyze surveys, experiments, and observational studies to judge the validity of the conclusion.

When a survey is used to gather data, it is important to consider how the sample is selected for the survey. If the _____, the survey will not accurately reflect the population.

Most national polls that are reported in the news are conducted using careful sampling methods in order to minimize bias. Other polls, such as those where people phone in to express their opinion, are not usually reliable as a reflection of the general population.

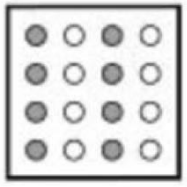
Remember that a _____ is one that involves _____. Six different types of samples are shown below.

Types of Samples



_____

Members are chosen using a method that gives everyone an equally likely chance of being selected.



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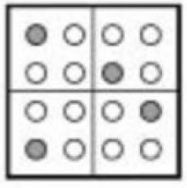
Members are chosen using a pattern, such as selecting every other person.



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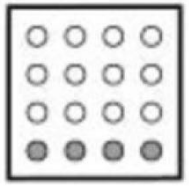
The population is first divided into groups. Then members are randomly chosen from each group.



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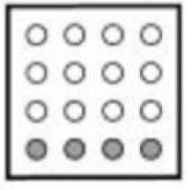
The population is first divided into groups. A sample of the groups is randomly chosen. All members of the chosen groups are surveyed.



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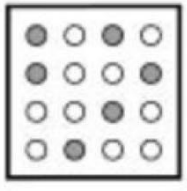
Members are chosen because they are easily accessible.



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Members volunteer to participate.

EXAMPLE 1

Classifying a Sample

The officials of the National Football League (NFL) want to know how the players feel about some proposed changes to the NFL rules. They decide to ask a sample of about 100 players. Classify each sample.

A The officials choose the first 100 players who volunteer their opinions.

B The officials randomly choose 3 players from each of the 32 teams in the NFL.

C The officials have a computer generate a list of 100 players from a database that includes all of the players in the NFL.

When choosing a _____ the most important concerns are usually accuracy and budget. The most accurate survey is a census, because it samples every individual in the population. However, a census is not always possible.

The sampling methods that are more accurate tend to be more difficult or expensive. For example, if you wanted a simple random sample of the entire United States, you would need a list of every person in the country to choose from.

_____ a sample where every member of the population being sampled has a nonzero probability of being selected. Simple random samples, stratified samples, and cluster samples are all examples of probability sampling. However, not every sampling method performed is a probability sample. A convenience sampling is not a probability sample, because people in the population who are not convenient for the surveyor to survey have no chance of being surveyed.

Self-selected sampling is also not a probability sample, although the reason why is more subtle. This kind of sampling is not a probability sample because the members of the population that don't self-select have no chance of being surveyed.

These non-probability methods of sampling are usually the easiest to conduct, but also the _____

Most Accurate	Very Accurate	Not Very Accurate

EXAMPLE 2

Evaluating Sampling Methods

A high school has 552 freshmen, 495 sophomores, 449 juniors, and 439 seniors enrolled. The student newspaper wants to take a survey of the school. Classify each sampling method. Which is most accurate? Which is least accurate? Explain your reasoning.

Imagine a polling organization that surveys 1000 voters in a city to find out how they plan to vote in an upcoming mayoral election. The organization reports that 58% of city residents plan to vote for Smith, and that the survey has a *margin of error* of ±3%. The margin of error expresses the amount of error in the survey results due to the nature of random sampling.

_____ a random sample defines an interval, centered on the sample percent, in which the population percent is most likely to lie. In the above example, the margin of error of ±3% means that the percent of voters in the population who plan to vote for Smith is likely to lie within 3 percentage points of 58%. That is, it is likely that between 55% and 61% of city voters plan to vote for Smith.

EXAMPLE 3

Interpreting a Margin of Error

Students at a high school will vote on a proposal to start classes later in the day. According to a survey of a random sample of students, 54% of the students agree with the proposal and 46% of the students disagree with the proposal. The survey's margin of error is ±5%. Does the survey clearly project the outcome of the voting?