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Algebra II

Surveys

Determining an unbiased, random sample. A *random sample* is one that is selected in a way that gives every different possible sample an equal chance of being chosen. Every member of the population must have the opportunity to be chosen in the sample. The sample should be large enough to represent a good portion of the population.

1. A survey team wants to determine what the favorite foods are of students in a high school. Determine whether the following would be unbiased, random samples. Assume all students have a normal schedule.

   a) Asking every fifth student entering the cafeteria Yes, all students go to Cafeteria

   b) Asking all fifth period English 9 students
   No, not all students are in English 9.

   c) Asking 5 randomly selected students in every physical education class
   Yes, all students take Phys Ed.

   d) Asking 20 randomly selected students in all study halls
   No, not all students take study hall.

   e) Asking students whose street address name starts with a vowel
   Yes, all students have a street address

   f) Asking randomly selected students in the culinary club
   No, not all students are in the culinary club

   g) Asking all students in a randomly selected English 9, English 10, English 11, and English 12 class
   Yes, all students are in one of those classes.

   h) Asking every fifth student entering the building in the morning
   Yes, all students enter the building

   i) Asking every fifth student at the Varsity Basketball game
   No, not all students attend the Varsity Basketball game.

Sample Statistics and Population Characteristics

We refer to summary measures calculated using data from an entire population as *population characteristics.* We refer to summary measures calculated using data from a sample as *sample statistics.* We generalize from a sample to the corresponding population. For example, if 20% of a sample of students drink iced tea, we can conclude that approximately 20% of all students drink iced tea. If the sample is not an unbiased random sample, it can cause the results to be flawed.

2. For the following situations, state whether they are examples of sample statistics or population characteristics. Write an accompanying sentence regarding the population.

   a) A box of Titleist Golf Balls were tested and it was found that 8% of them had imperfections. (Population: Titleist Golf Balls)

   Sample (only a box was tested). Approximately 8% of all Titleist Golf Balls have imperfections.

   b) Yellowstone National Park's animals are comprised 62% of bison. (Population: Animals in Yellowstone National Park)

   Population ~~pro~~ characteristic. 62% of the animals in Yellowstone National Park are bisons.

   c) In a survey, it was found that 43% of voters voted for candidate A. (Population: People who voted in the election)

   Sample statistic (the people that were surveyed) Approximately 43% of all voters in the election voted for candidate A.

   d) 88% of the more than 300 million automobile tires discarded per year are recycled or used for fuel. (Population: Automobile tires discarded per year)

   Population proportion. 88% of all automobile tires discarded are recycled or used for fuel.

   e) 64% of respondents in a recent poll indicated that residents of Juarez favored building a proposed highway in their town. (Population: Residents of Juarez)

   Sample statistic (those who responded to the poll) Approximately 64% of the residents of Juarez favor building a highway

3. For the following items of interest, describe an appropriate population, population characteristic, sample, and sample statistic. Answers may vary.

a) Time it takes students to run a quarter mile

Population: all students in Westbury High School

Population characteristic: the average time it takes a WHS student to run a quarter mile

Sample: every 5th student arriving to gym class

Sample statistic: The average time it took students in the sample to run a quarter mile.

b) Westbury residents that own an iPhone

Population: Westbury residents

Population characteristic: the percent of Westbury residents that own an iPhone.

Sample: every fifth house in Westbury

Sample statistic: the percent of the chosen sample that have an iPhone.

c) Hours of sleep that Juniors get per night

Population: Juniors in Westbury High School.

Population characteristic: Average hours of sleep of juniors in WHS

Sample: ~~every~~ randomly selecting students in every English 11 class

Sample statistic: Average hours of sleep of students chosen in the sample

d) Algebra II Regents scores

Population: Students enrolled in Algebra II in westbury high School

Population characteristic: Average Regents score of students enrolled in WHS

Sample: ~~Ran~~ Randomly selecting 10 students in every Algebra II class.

Sample statistic: Average Regents score of students that were randomly selected

4. Which statement(s) about statistical studies is true?

I. A survey of all English classes in a high school would be a good sample to determine the number of hours students throughout the school spend studying. Yes

II. A survey of all ninth graders in a high school would be a good sample to determine the number of student parking spaces needed at that high school. No, 9th graders don't even drive

III. A survey of all students in one lunch period in a high school would be a good sample to determine the number of hours adults spend on social media websites. No, the adults aren't in a high school

IV. A survey of all Calculus students in a high school would be a good sample to determine the number of students throughout the school who don't like math. No, not everyone takes calculus

1) I, only

2) II, only

3) I and III

4) III and IV

5. Which survey is *least* likely to contain bias?

1) surveying a sample of people leaving a movie theater to determine which flavor of ice cream is the most popular Yes, liking movies doesn't affect which ice cream flavor you like

2) surveying the members of a football team to determine the most watched TV sport No, they like football

3) surveying a sample of people leaving a library to determine the average number of books a person reads in a year No, they like books

4) surveying a sample of people leaving a gym to determine the average number of hours a person exercises per week No, they like to exercise

6. A survey is to be conducted in a small upstate village to determine whether or not local residents should fund construction of a skateboard park by raising taxes. Which segment of the population would provide the most unbiased responses?

1) a club of local skateboard enthusiasts No, they want it.

2) senior citizens living on fixed incomes No, they don't want it.

3) a group opposed to any increase in taxes No, they won't vote for it.

4) every tenth person 18 years of age or older walking down Main St. Yes, it's random.

7. A survey is being conducted about American's favorite musicians. Which of the following survey methods would most likely produce a random sample?

(1) Asking every 20th person at a Green Day concert No, they like rock music

(2) Asking every 10th person at a vintage record store No, they like old music

(3) Asking every 10th person at the Westbury Public Library No, Westbury doesn't represent all of America

(4) Sending out surveys to random households across the country.

Yes, although surveys may create some bias, it is random

8. Which method of collecting data would most likely result in an unbiased random sample?
(1) selecting every third teenager leaving a movie theater to answer a survey about entertainment No, they like movies
(2) placing a survey in a local newspaper to determine how people voted in the 2004 presidential election No, not everyone reads the paper
(3) selecting students by the last digit of their school ID number to participate in a survey about cafeteria food yes! Random
(4) surveying honor students taking Trigonometry to determine the average amount of time students in a school spend doing homework each night No, not everyone takes Honors Trig and those students have more homework than most.

9. A survey completed at a large university asked 2,000 students to estimate the average number of hours they spend studying each week. Every tenth student entering the library was surveyed. The data showed that the mean number of hours that students spend studying was 15.7 per week. Which characteristic of the survey could create a bias in the results?
(1) the size of the sample (3) the method of analyzing the data
(2) the size of the population ~~(4)~~ the method of choosing the students who were surveyed
asking students in the library is biased. They study more than most.

10. The yearbook staff has designed a survey to learn about student opinions on how the yearbook could be improved for this year. If they want to distribute this survey to 100 students and obtain the most reliable data, they should survey
(1) Every third student sent to the office not everyone gets sent to the office
(2) Every third student to enter the library not everyone goes to the library
(3) Every third student to enter the gym for the basketball game not everyone goes to the basketball game
~~(4)~~ Every third student arriving at school in the morning

11. You want to determine if students would be interested in joining a new club you would like to start. Describe in detail how you would determine how many students are interested. Include your population, sample, and incorporate your sample statistic and population characteristic.

I would choose a random sample (every 5th person entering the building). I would find the proportion of them that are interested in the club. I would use that sample statistic to approximate the population characteristic