

1.1 Section Exercises

Population and Sample

For each scenario, identify the population being studied and the sample chosen.

1. A national magazine wishes to determine America's favorite celebrities. A ballot is included in the November issue of the magazine. Readers are encouraged to mail in their ballots.
2. An education professor wants to gather information about parental involvement in early education for students attending a particular Ivy League university. She obtains a list of registered students from the registrar's office and randomly chooses 300 students to study.
3. A large discount store wants to determine the average income of its shoppers. A researcher chooses 100 shoppers at random between the hours of 1 and 5 p.m. on Thursday.
4. A hotel chain wants to build a new facility. The board of directors uses a list of the top 100 vacation spots in America and visits 20 of the cities on the list to determine their feasibility as the new hotel's location.

Population, Sample, Parameters, and Statistics

For each scenario, determine the population and sample, if given. Also, determine whether the highlighted value is a parameter or a statistic.

5. The manufacturer of Energy Bolt soda is testing for quality control. The company determines that **99.97%** of all soda cans produced meet their quality standards.
6. Ms. Weigang wishes to determine the average ACT score for all students in her 11:00 algebra class. To do so, she anonymously collects information from each student. She calculates that the average ACT score for the class is **19.2**.
7. The Nielsen Company wishes to determine which genre of program is streamed most often among Americans aged 18–25. They survey a group of 1045 adults aged 18–25 about what programs they stream on a regular basis. It is determined that **53%** of survey respondents say that their favorite programs are comedies.
8. A research group wishes to know the average salary of professors at public universities in the United States. It is determined from public records that professors at public universities earn an average salary of **\$63,461** per year.
9. A horticulturist is testing to see whether a new fertilizer produces plants that are significantly taller than those grown with traditional fertilizers. His greenhouse contains 520 plants treated with the new fertilizer. He measures 60 plants and determines that their average height is **22.9** inches.
10. A study is conducted in order to determine the percentage of high school seniors in the Atlanta area who plan to major in business upon entering college. For the study, 230 seniors from Atlanta area high schools are randomly chosen and surveyed. Of these, **42%** say that they intend to major in business upon entering college.
11. For her dissertation, Maria needs to estimate the average number of hours per week that children aged 10–12 spend in front of a screen. She randomly surveys 250 schoolchildren in her area who are between 10 and 12 years old and calculates an average of **17.4** hours of screen time per week.
12. For a news special, a reporter wishes to determine what percentage of adults in her viewing area are overweight. A random sample of 1067 adults from the area is chosen for the study. **40%** of adults sampled are found to be overweight.

13. The governor of a Midwestern state wants to know his approval rating following a recent scandal. Using a telephone poll of registered voters in his state, 565 constituents are surveyed. The researchers determine that 37% of the governor's constituents that were surveyed currently approve of the job he is doing in office.
14. A large real estate firm wants to know the average price per square foot for condominiums in Okaloosa County, Florida. Based on real estate records for all condominiums in the county, the firm determines that condominiums in Okaloosa County sell for approximately \$300 per square foot.
15. A consumer advocacy group wants to survey residents in the Northeast regarding hospital care. They mail out 10,500 surveys to randomly selected households in the Northeast. A total of 984 surveys are completed and returned. Out of this group, 64% say that their hospital care was above average. After analyzing all of the surveys, the consumer advocacy group determines that approximately 90% of people in the Northeast are satisfied with hospital care in their region.
16. The PTA of Brownsville is concerned about the number of hours that high school students spend each week using social networking websites. A group of 40 high school students is chosen at random and asked to take note of the amount of time spent using social networking websites during the following week. Out of these 40 students, 14 logged over 20 hours and another 9 logged between 15 and 20 hours on social networking sites that week. However, 18 said they were online on a near constant basis. That's a staggering 45% of teens surveyed.

Read the following fictitious studies. For each, determine the population, sample, parameter(s), and statistic(s).

17. Java Express is a company that sells high-end coffee appliances and gourmet coffee. Due to the current economic conditions, the company is looking into ways to change its strategy in order to appeal to more frugal consumers.

Before investing in costly setup expenses, Java Express needs to know the percentage of coffee consumers who would buy from a new line of less expensive products. To estimate this percentage, the company chooses 5 of its largest markets and surveys every registered customer from each of these chosen markets. A total of 6195 customers complete the survey.

The results show that 45% of those surveyed are very interested in the new line of products, 32% are somewhat interested, and the remaining 23% are not interested in the new products at all. Based on these results, the researchers estimate that approximately 77% of coffee consumers will be receptive to the new line of products. Java Express decides that it is worthwhile to introduce a new line of less expensive products to the market.

18. A study was conducted to investigate whether or not exercise is a factor in the overall outlook and positive spirit of Americans.

For the study, 400 Americans were selected at random from each of the following two categories: those who exercise on a regular basis and those who do not. For the purpose of the study, regular exercise was defined to be light to moderate activity at least three times per week. A total of 800 Americans completed the brief telephone survey. Of those who exercise regularly, 74% said that their overall outlook on life is positive. Of those who do not exercise regularly, 68% said that their overall outlook on life is positive.

Though not a definitive study, the researchers concluded that exercise does appear to influence the attitudes of Americans. In addition, the researchers estimated that approximately 71% of all Americans have a positive outlook. Further research would likely be conducted on the subject at a later time.

Descriptive vs. Inferential Statistics

Decide whether the following statements are examples of descriptive or inferential statistics.

19. Eighty-two percent of the employees from a small local company attended the annual company picnic.
20. Based on information from a recent survey, researchers estimate that the average American will spend \$751 on gifts this Christmas.
21. The average age of entering freshmen at the University of Senatobia is 20.8 years old, based on information from the registrar's office.
22. Sixty-five percent of seniors at a local high school who are applying to college apply to at least one college out of state.
23. The average number of hours vacationers spend in national parks during the summer months is 4.5 hours, based on a survey of 1000 visitors in various national parks.
24. An outdoor sporting retailer predicts that the percentage of customers who sign up for guided adventures they offer will increase by 9% next year based on new predictive analytics.

For each scenario, answer the questions that follow.

25. Since 1878, the Bureau of Labor Statistics has calculated the unemployment rate by surveying a group of randomly selected Americans (currently around 60,000) in regard to their employment status. A person is considered unemployed if he or she does not have a job and has looked for a job in the previous four weeks. Recently the method for compiling the unemployment rate has been criticized for not giving an accurate estimate of the true percentage of jobless Americans.
 - a. What is the population of the study?
 - b. What groups of jobless Americans might be left out based on the way "unemployed" is defined?
 - c. The unemployment rate is often used for comparison. For example, in recent times economists compared the unemployment rates computed each month during the recession of 2009 and 2010 to those of the Great Depression, when unemployment peaked at around 25%. Could comparisons like this be made if the method used to collect data for the unemployment rate was changed?

26. Suppose you are given the task of determining whether it would be profitable to open a new ladies' health club in the Atlanta suburb of Marietta, Georgia. Which of the following options would be the best choice for the population of your study? Explain your answer.
- All women in metro Atlanta who exercise regularly
 - All women in Marietta, Georgia
 - All women in Marietta, Georgia who exercise regularly
 - All residents of the metro Atlanta area
27. A car manufacturer is in the design process for a new sedan that it plans to launch. Before finalizing the body type and other details about the car, the company wants to know the preferences of their target market. The manufacturer would like its new car to be appealing to all age groups, but its particular focus is on drivers in their 20s and 30s.
- The company wants to know the preferences of drivers in their "20s and 30s." How might the company better define the population of the study?
 - Imagine that you are the researcher. Brainstorm different ways that you might collect data and obtain a sample that represents the population well.
28. Suppose you are assigned the task of identifying the "average resident of your neighborhood".
- What type of data should you collect from your neighbors?
 - Should you use a population or sample? Explain your answer.
 - Will your conclusions be descriptive or inferential?