

Chapter 11 Exercises

In each scenario, identify the population, the sample, and any population parameters or sample statistics that are given.

1. The report titled *The American Freshman* looks at national norms of college freshman by analyzing the responses of 203,967 first-time, full-time freshmen entering 270 baccalaureate institutions across the United States. It found that over the past two years, the percentage of students who describe themselves as “liberal” (27.6%) or “conservative” (20.7%) has not changed significantly. The percentage of those identifying as “middle of the road” (47.4%) has risen slightly.²¹
2. *Social Metadata for Libraries, Archives, and Museums*: Executive Summary reported on work done in 2009–2010 by a 21-member RLG Partner Social Media Working Group from five countries. Their work reviewed 76 online sites that were relevant to libraries, archives, and museums. The sites supported social media features such as tagging, comments, reviews, etc. Among their findings, they reported that more than 70% of library sites have been offering social media features for 2 years or less and that 83% of respondents add new content at least monthly. Most of the respondents manage their own sites rather than use hosted services.²²

Answer each question thoughtfully.

3. Suppose you want to know the proportion of students who wear glasses on your campus. Is simply surveying your current class a good sample to choose? Why or why not?
4. Suppose that in a race, male participants are given even entry numbers and females are given odd entry numbers. Would choosing every 10th runner to answer a survey give a representative sample of all racers? What about every 5th runner? Why?
5. You are assigned the task of determining the average age of people who shop at the local mall.
 - a. Describe at least three different methods of sampling that could be used for the task. Which method would you say is the best one to use? Why?
 - b. Describe any potential for bias in your method.

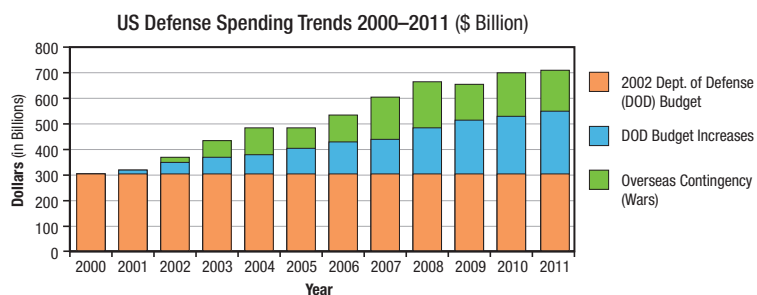
²¹ John H. Pryor et al., *The American Freshman*

²² Karen Smith-Yoshimura, *Social Metadata for Libraries, Archives, and Museums*

6. Determine which type of graph would most clearly depict the data described.
- The enrollment size at Austin Peay State University (APSU) over the past decade
 - The size of each class—freshman, sophomore, junior, senior—for the current year at APSU
 - The size of each class—freshman, sophomore, junior, senior—for the current year at APSU, specifically comparing the genders of students in each category
 - The enrollment sizes of all state universities across the country
7. A clinical trial was designed to check the side effects of the drug for insomnia. Researchers gathered a group of people who suffered from insomnia and had no other pronounced diseases. Some of the people were given the drug, and the others were given a placebo. The patients didn't know whether they were taking the drug or placebo, but the researchers did know. After two weeks, the subjects were surveyed about side effects they noticed.
- Identify the explanatory and response variables.
 - Identify the treatment in the experiment.
 - Determine which group is the treatment group and which group is the control group.
 - State whether the experiment is a single-blind or double-blind study. Do you think this is the best choice for this study?

Solve each problem.

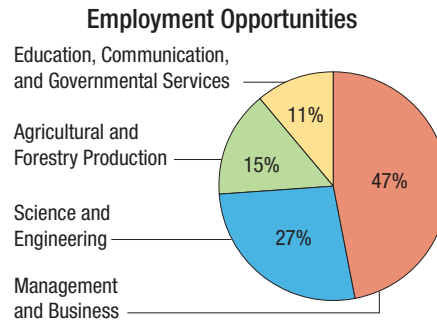
8. Use the stacked bar graph on US defense spending trends from 2000–2011 to answer the following questions.²³



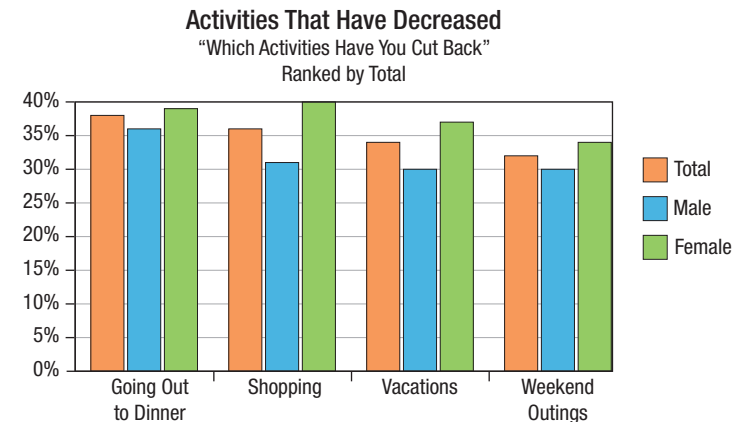
- How much is the estimated total spending for 2011?
- How much has spending increased from 2000 to 2011 in the Overseas Contingency category?
- By how much has the Department of Defense (DOD) budget increased from 2000–2011?
- Would you say that the stacked bar graph is a good way to represent the data here? Why or why not?

23 Emily Skarbek, "How Would You Cut Defense Spending?" <http://www.mygovcost.org>

9. The US Department of Agriculture estimates that between 2010 and 2015, the US economy will generate 54,000 annual openings requiring baccalaureate or higher degrees in food, renewable energy, and environmental specialties. Use the graph about employment opportunities to answer the following questions.²⁴



- What percentage of the jobs are expected to be in the business and science occupations?
 - Over the 5 years, how many total jobs openings are expected in education, communication, and governmental services?
 - How many annual openings are there expected to be in agricultural and forestry production?
 - Would you say that the pie chart is a good way to represent the data given? Why or why not?
10. Consider the following graph showing the results of a personal entertainment survey.



- Name at least two things that are missing from the graph for it to be an effective means of informing people about the data.
- List ways in which a reader might be unclear or misled about what the graph shows.

For each data set, calculate the following numerical descriptors: mean, median, mode, range, sample standard deviation, and five number summary.

11. Area prices for unleaded gasoline for the week of 1/25/2013 are found to be the following.

\$3.07 \$3.49 \$3.05 \$3.35 \$3.29 \$3.06 \$3.18 \$3.29

\$3.21 \$3.29 \$3.29 \$3.31 \$3.05 \$3.21 \$3.19

12. Whitt gathered the following data from students living in his dorm.

2	0	1
0	1	0
6	1	1
0	0	2
0	3	0
4	0	1

13. Consider the weight in grams of 15 soda cans chosen at random from a batch by a quality control inspector.

343	335	338	344	333
345	324	329	322	323
342	341	326	334	335

- Find the five-number summary of the weights.
- What percentage of weights is at or below 333 grams?
- What is the range of weights in the chosen batch?

Calculate the standard score for each given value. Round your answer to the nearest hundredth.

14. $\mu = 20, \sigma = 2$

a. $x_1 = 22$

b. $x_2 = 19$

c. $x_3 = 25$

15. $\bar{x} = 16.9, s = 0.04$

a. $x_1 = 17.15$

b. $x_2 = 16.84$

c. $x_3 = 17.4$

Solve each problem.

- Scores on a test have a mean of 86 and a standard deviation of 13. Jerrica has a score of 94. Convert Jerrica's score to a z-score.
- Hasef scored a 55 on a test with a mean of 47 and a standard deviation of 9. Kimberly had a score of 168 on a test with a mean of 145 and a standard deviation of 26. Which score was better with respect to the mean score on the given test?

