

4.6 Exercises

Basic Concepts

1. What is a proportion?
2. What is the difference in notation between a population proportion and a sample proportion?
3. Other than the mode, proportions are one of the few summary methods available to analyze what type of data?

Exercises

4. A survey of shoppers at a local mall was taken to study the shopping habits of consumers. The mall contains a variety of specialty stores, especially stores that specialize in electronics and gadgets. One question in particular asked, “Do you enjoy shopping for electronics?” Of the 300 men surveyed, 175 answered “Yes.” Of the 200 women surveyed, 55 answered “Yes.”
 - a. What proportion of men enjoy shopping for electronics?
 - b. What proportion of women enjoy shopping for electronics?
 - c. What is the overall proportion of consumers at the Tech Mall that enjoy shopping for electronics?
5. A survey released in April 2011 conducted by the consulting firm Booz & Company regarding the automobile industry found that U.S. automotive executives were skeptical about the industry’s economic recovery. Suppose that 118 original equipment manufacturers (OEM) and 82 supplier executives participated in the study. When asked whether the overall state of the industry is fairly similar to, or somewhat better than, its low point in January 2009, 59 OEMs and 28 supplier executives answered that the current state of the industry was “about the same,” and 55 OEMs and 52 supplier executives answered that the current state of the industry was “somewhat better.”

Source: Booz & Company; 2011

- a. Calculate the sample proportion of original equipment manufacturers that believe the state of the automobile industry is “about the same” as in January 2009.
- b. Calculate the sample proportion of supplier executives that believe the state of the automobile industry is “about the same” as in January 2009.
- c. Calculate the sample proportion of original equipment manufacturers that believe the state of the automobile industry is “somewhat better” than in January 2009.
- d. Calculate the sample proportion of supplier executives that believe the state of the automobile industry is “somewhat better” than in January 2009.
- e. Do these responses seem to support Booz & Company’s conclusion that automotive executives are skeptical about the industry’s economic recovery? Discuss.

6. An experiment was conducted to study how investors selected mutual funds. Two groups of investors were selected. Group 1 consisted of investors that used online brokerages and Group 2 was made up of investors that used full-service brokerages. Of the 150 investors in Group 1, 120 indicated that they selected mutual funds on their own, while 30 stated that they selected mutual funds using recommendations of the brokerage, family, and friends. Of the 200 investors in Group 2, 25 indicated that they selected their funds on their own, while 175 indicated that they selected the mutual funds using recommendations of the brokerage, family, and friends.
- What proportion of Group 1 investors selected mutual funds on their own?
 - What proportion of investors in Group 2 selected mutual funds on the recommendation of others?
 - What does this tell you about investors that use online brokerages versus those using full-service brokerages?
7. According to a study administered by the National Bureau of Economic Research, half of Americans would struggle to come up with \$2000 in the event of a financial emergency. The majority of the 1900 Americans surveyed said they would rely on more than one method to come up with emergency funds if required. In the survey, 532 people said that they “certainly” would not be able to cope with an unexpected \$2000 bill if they had to come up with the money in 30 days, and 418 people said they “probably” would not be able to cope.

Source: CNNMoney.com; 2011

- What percentage of Americans “certainly” would not be able to produce \$2000 in the event of an emergency according to the study?
 - What percentage of Americans would “probably” not be able to pay a \$2000 bill in 30 days if required?
 - What does this say about the savings habits of Americans?
8. What college football conference has the right to brag about putting players in the NFL? A random sample of 100 current NFL players was surveyed to determine the conference in which they played college football. The following table displays the results of the survey.

NFL Players and College Football Conferences	
Conference	Number of Players
SEC	20
Big 12	16
Big 10	12
Pac 10	6
ACC	6
MAC	2
Big East	2
Other	36

- What proportion of players are from the SEC?
- What proportion of players are from a conference other than the first 6 listed?
- Is it true that a player in the SEC has a better chance of being drafted in the NFL than a player from any other conference? Explain.

9. According to a survey administered by the market research group ChangeWave in February 2011, approximately 27% of respondents reported that they plan on buying a tablet device in the future. This result was 2 percentage points higher than in a similar survey administered in November of 2010. In the February study, 3091 customers were surveyed on tablet demand and future buying trends. Suppose that in the November study, 721 people said they planned on buying a tablet device in the future.

Source: InvestorPlace; 2011

- a. In the February study, how many people said that they planned on buying a tablet device in the future?
 - b. In the November study, how many total customers were surveyed?
10. It is no secret that Wall Street firms compete aggressively to lure their clients. Having more high-end clients translates into fees and revenues that turn into profits. A survey of 150 high-end clients asked what lured them to their respective Wall Street firm. The following table shows the results.

High-End Client Response	
Perk Received	Client Response
Pay a Kick-Back	25
Lucrative Golf Outings	12
Lavish Dinners	8
Free Private Jet Use	33
Prime Seats at Sports Events	20
Other	22
No Perk Received	30

- a. Which type of perk appears to be most successful in luring clients?
- b. What proportion of clients were lured to a Wall Street firm by the perk identified in part a.?
- c. What proportion of clients did not receive a perk at all?
- d. Given that these perks aren't inexpensive, what conclusion can you make about providing perks to clients? Explain.

4.7 Measures of Association Between Two Variables

Oftentimes a manager or decision maker is interested in the relationship between two variables. Such relationships could be the amount of sales and advertising expenditures, education level and income, number of contacts made and sales, sales and earnings, number of real estate foreclosures and home prices, and so on. In earlier sections, we discussed methods used to study each of these measurements individually. Now we want to study the measurements of two different variables at the same time to see if there is a relationship between them. The purpose of studying the relationship between two variables is three-fold: to describe and understand the relationship, to forecast and predict a new observation, and if one is working with a process, not understanding the relationship could be detrimental to making necessary adjustments. There are statistical tools that can aid in the discovery of relationships.

Thinking about relationships is something that everyone does. Why, for example, does an admissions counselor want to know the relationship between SAT scores and college performance? The admissions counselor's task is to select students who will be successful at that college. If college performance is related to SAT scores and the relationship can be specified explicitly, then SAT scores can be used to *predict* performance. Consequently, the