Statistics for Management and Economics 12th edition Keller Solutions Manual

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Solution and Answer Guide

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Chapter 1: What is Statistics?

Table of Contents

Chapter Exercises 1

Chapter Exercises

1.1. In your own words, define and give an example of each of the following statistical terms.

a. population

b. sample

c. parameter

d. statistic

e. statistical inference

Solutions:

1.2. Briefly describe the difference between descriptive statistics and inferential statistics.

Solutions:

Descriptive techniques summarize data. Inferential techniques draw inferences about a population based on sample data.

1.3. A politician who is running for the office of mayor of a city with 25,000 registered voters commissions a survey. In the survey, 48% of the 200 registered voters interviewed say they plan to vote for the politician.

a. What is the population of interest?

b. What is the sample?

c. Is the value 48% a parameter or a statistic? Explain.

Solutions:

a. The population is the 25,000 registered voters.

b. The sample is the 200 registered voters.

c. The 48% figure is the statistic.

1.4. A manufacturer of computer chips claims that less than 10% of its products are defective. When 1,000 chips were drawn from a large production, 7.5% were found to be defective.

a. What is the population of interest?

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b. What is the sample?

c. What is the parameter?

d. What is the statistic?

e. Does the value 10% refer to the parameter or to the statistic?

f. Is the value 7.5% a parameter or a statistic?

g. Explain briefly how the statistic can be used to make inferences about the parameter to test the claim.

Solutions:

a. The population is the complete production run.

b. The sample is comprised of the 1,000 chips.

c. The parameter is the proportion of defective chips in the production run.

d. The statistic is the proportion of defective chips in the sample.

e. The 10% figure refers to the parameter.

f. The 7.5% figure refers to the statistic.

g. We can estimate that the population proportion is 7.5%. Statistical inference methods will allow us to determine whether we have enough statistical evidence to reject the claim as the sample proportion.

1.5. Suppose you believe that, in general, graduates who have majored in *your* subject are offered higher salaries upon graduating than are graduates of other programs. Describe a statistical experiment that could help test your belief.

Solutions:

Draw a random sample from the population of graduates who have majored in your subject and a random sample of graduates of other majors and record their highest salary offers.

1.6. You are shown a coin that its owner says is fair in the sense that it will produce the same number of heads and tails when flipped a very large number of times.

a. Describe an experiment to test this claim.

b. What is the population in your experiment?

c. What is the sample?

d. What is the parameter?

e. What is the statistic?

f. Describe briefly how statistical inference can be used to test the claim.

Solutions:

a. Flip the coin (say 100 times) and record the number of heads (assuming that you are interested in the number of heads).

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b. The population is composed of the theoretical result of flipping the coin an infinite number of times and recording either "heads" or "tails."

c. The sample is comprised of the "heads" and "tails" in the sample.

d. The parameter is the proportion of heads (again assuming that your interest is the number of heads rather than tails) in the population.

e. The statistic is the proportion of heads (or tails depending on the choice made in part d).

f. The sample statistic can be used to judge whether the coin is actually fair.

1.7. Suppose that in Exercise 1.6 you decide to flip the coin 100 times.

a. What conclusion would you be likely to draw if you observed 95 heads?

b. What conclusion would you be likely to draw if you observed 55 heads?

c. Do you believe that, if you flip a perfectly fair coin 100 times, you will always observe exactly 50 heads? If you answered "no," then what numbers do you think are possible? If you answered "yes," how many heads would you observe if you flipped the coin twice? Try flipping a coin twice and repeating this experiment 10 times and report the results.

Solutions:

a. We would conclude that the coin is not fair.

b. We may conclude that there is some evidence that the coin is not fair.

1.8. **Xr01-08** The owner of a large fleet of taxis is trying to estimate costs for next year's operations. One major cost is fuel purchase. To estimate fuel purchase, the owner needs to know the total distance the taxis will travel next year, the cost of a gallon of fuel, and the fuel mileage of his taxis. The owner has been provided with the first two figures (distance estimate and cost of a gallon of fuel). However, because of the high cost of gasoline, the owner has recently converted the fleet's taxis to operate on propane. The propane mileage (in miles per gallon) for 50 taxis has been measured and recorded.

a. What is the population of interest?

b. What is the parameter the owner needs?

c. What is the sample?

d. What is the statistic?

e. Describe briefly how the statistic will produce the kind of information the owner wants.

Solutions:

a. The population is made up of the propane mileage of all the cars in the fleet.

b. The parameter is the mean propane mileage of all the cars in the fleet.

c. The sample is composed of the propane mileage of the 50 cars.

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d. The statistic is the mean propane mileage of the 50 cars in the sample.

e. We can use the sample statistic to estimate the population parameter.

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