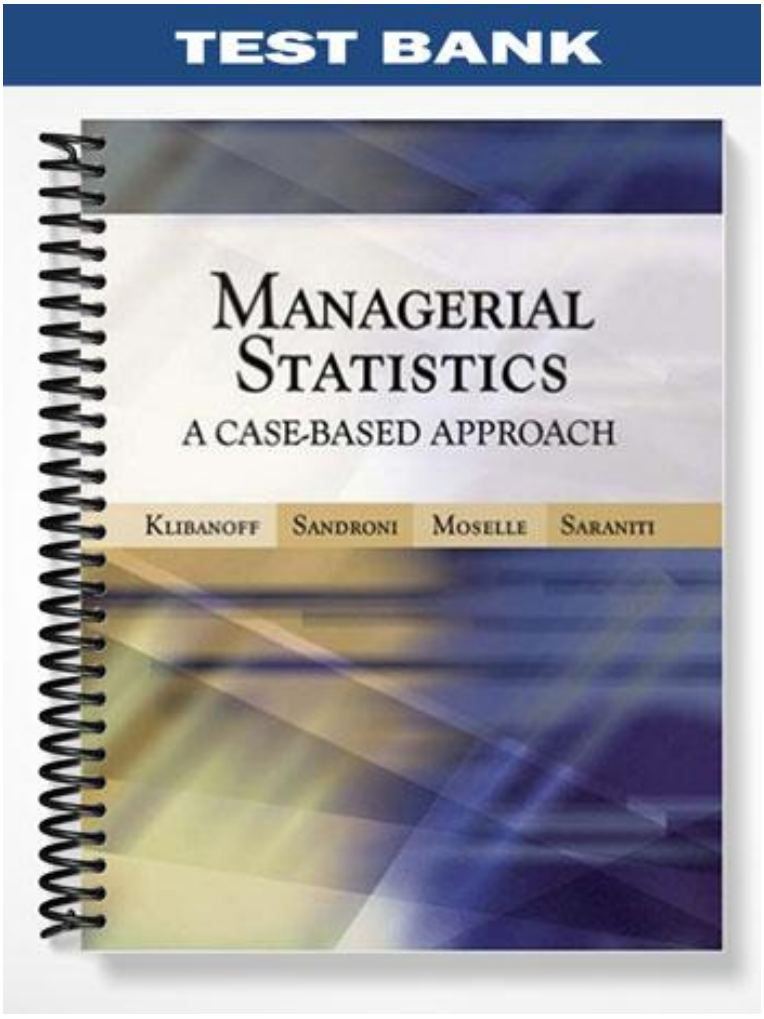
TEST BANK


MANAGERIAL
STATISTICS
A CASE-BASED APPROACH
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Chapter 2 questions

Multiple choice questions

1. Hypothesis testing can result in
    a. rejecting the null hypothesis.
    b. not rejecting the null hypothesis.
    c. rejecting the alternative hypothesis.
    d. accepting the null hypothesis.
2. We commit a type I error when we
    a. reject the null hypothesis when the null hypothesis is true.
    b. accept the null hypothesis when the null hypothesis is false.
    c. do not reject the null hypothesis when the null hypothesis is false.
    d. reject the alternative hypothesis when the alternative hypothesis is true.
3. We commit a type II error when we
    a. reject the null hypothesis when the null hypothesis is false.
    b. do not reject the null hypothesis when the null hypothesis is false.
    c. accept the null hypothesis when the null hypothesis is false.
    d. reject alternative hypothesis when the alternative hypothesis is true.
4. The level of significance of a hypothesis test, often denoted by α, is a
    a. minimum acceptable probability of committing type I error.
    b. maximum acceptable probability of committing type II error.
    c. maximum acceptable probability of committing type I error.
    d. minimum acceptable probability of committing type II error.
5. The power of a hypothesis test, often denoted by β, is a
    a. minimum acceptable probability of committing type I error.
    b. maximum acceptable probability of committing type II error.
    c. maximum acceptable probability of committing type I error.
    d. minimum acceptable probability of committing type II error.
6. Two tailed hypothesis test is used when the
    a. null hypothesis is an inequality.
    b. alternative hypothesis is an equation.
    c. alternative hypothesis is an inequality.
    d. null hypothesis is an equation.
7. The variance of a difference of two random variables is equal to the
    a. sum of the variances of those variables.
    b. difference of the variances of those variables.
    c. product of the variances of those variables.
    d. ratio of the variances of those variables.
8. You want to test whether the proportion of the left handed people is the same in two populations. In two samples, both consisting of 100 observations, you have 4 and 5 of the left handed people respectively. You want to test whether the proportion of the left handed people is the same in both populations. The value of the test statistics is
    a. 0.322234
    b. 0.411124

c. 0.341196
d. 0.232443

9. A recent survey showed that, in the sample of 150 cars in Chicago, 2 out of 16 cars are silver. At the same time, in the sample of 160 cars in New York, 2 out of 33 cars are silver. You want to test whether the proportion of silver cars is the same in Chicago and New York. The value of the test statistic is
   a. 2.019212
   b. 1.852324
   c. 1.972343
   d. 1.954927
10. You asked some of your friends how long it takes them to get from home to the school. In the group of 10 people from the south side of your town the mean was equal to 25 minutes. The sample variance in this group was equal 10 minutes^2. In the group from the north side of the town (also consisting of 10 people) the mean was equal to 30 minutes, but the sample variance equals 15 minutes^2. You want to test whether the time necessary to get from home to the school is the same no matter where you live. The value of the test statistic is equal
   a. 3.162278
   b. 3.908722
   c. 3.891924
   d. 3.324562
11. If we want to test whether the difference between the means of two populations with unknown variances and the sample sizes are n_1 and n_2, then the test statistics has
   a. t distribution with $n_1 + n_2 - 2$ degrees of freedom.
   b. standard normal distribution.
   c. t distribution with $n_1 + n_2 - 1$ degrees of freedom.
   d. t distribution with $n_1 - 1$ degrees of freedom.
12. If we want to test whether proportions are the same in two samples and the sample sizes are n_1 and n_2, then the testing statistics has
   a. t distribution with $n_1 + n_2 - 2$ degrees of freedom.
   b. standard normal distribution.
   c. t distribution with $n_1 + n_2 - 1$ degrees of freedom.
   d. t distribution with $n_1 - 1$ degrees of freedom.
13. There are two samples with the sample means 12 and 12.5. Both of those samples consist of 16 observations. The sample variances are 2 in both cases. If you want to test whether the population means are the same, then the test statistic is distributed as a
   a. t distribution with 30 degrees of freedom and the value of the test statistic is $t = 1$.
   b. t distribution with 31 degrees of freedom and the value of the test statistic is $t = 0.5$.
   c. standard normal distribution and the value of the test statistic is $z = 1$.
   d. standard normal distribution and the value of the test statistic is $z = 0.5$.

14. There are two samples with means 13.5 and 13. Both of those samples consist of 18 observations. The sample standard deviations are equal 3 in both cases. If you want to test whether the population means are the same, then the test statistic is distributed as a
    a. *t* distribution with 34 degrees of freedom, $t = 1$.
    b. *t* distribution with 34 degrees of freedom, $t = 0.5$.
    c. standard normal distribution, $z = 1$.
    d. standard normal distribution, $z = 0.5$.
15. There are two samples with means 13 and 12. Both of those samples consist of 16 observations. Sample variances are equal to 4 in both cases. If you want to test whether the difference between the mean in the first and the mean in the second population is equal to 1, then the testing statistic is
    a. *t* distribution with 31 degrees of freedom and the value of the test statistic is $t = 0.5$.
    b. *t* distribution with 30 degrees of freedom and the value of the test statistic is $t = 0$.
    c. standard normal distribution and the value of the test statistic is $z = 1$.
    d. standard normal distribution and the value of the test statistic is $z = 0.5$.

Analysis and interpretation questions

1. You recently started selling hot-dogs over the weekends. After observing sales for 5 weeks you got the following number of hot-dogs sold each weekend.

Week	**1**	**2**	**3**	**4**	**5**
Saturday	50	49	52	45	56
Sunday	54	57	53	48	55

    a. Compute the mean sales on Saturdays and Sundays.
    b. Compute sample variances of sales on Saturdays and Sundays.
    c. What is the value of the test statistic used for testing the hypothesis that the sales are the same on Saturdays and Sundays?
    d. What is the value of the test statistic used for testing the hypothesis that the sales on Saturdays are on average 5 hot-dogs bigger than the sales on Sundays?
    e. What is the distribution of those test statistics?
    f. How should you change your answer if you know population variances? What about the distribution of the test statistic in this case?

2. One of your friends wants to sell lemonade. He believes that selling lemonade will be profitable only if the mean temperature will be above 74F. In the table below, you can find average temperatures in Chicago in July and August over the last six years.

Year	**1999**	**2000**	**2001**	**2002**	**2003**	**2004**
July mean temp.	78.4	73.1	75.8	78.1	74.7	72.9

August mean temp.	71.6	74.3	74.4	74.9	75.9	68.5

Your friend also managed to find sample variances of temperatures in July and August over that whole period. The sample variance of temperature in July is equal to 4. The sample variance of temperature in August is equal 3.

a. Compute the mean temperatures in July.
b. Compute the mean temperatures in August.
c. Write down the null hypothesis for testing whether the mean temperature in July is 74F or higher.
d. Write down the null hypothesis for testing whether the mean temperature in August is 74F or higher.
e. What are the values and distributions of the test statistics for July and August? Notice that you have to take into account that each mean temperature actually represents mean from 31 days in each month.
f. Write down the null hypothesis for testing whether the mean temperatures are the same in both months.

3. The marketing department wants to spend more on advertising in a weekend edition of a popular newspaper. They claim that over the weekend, the company's website attracts more traffic; almost all customers that visit the website check special offers that were presented in the weekend advertisement. They collected the data for 10 weeks – advertisement was published in one weekday edition and one weekend edition each week. In the file **ch2qa3.xls** you can find the data. Each row of the dataset represents one week.
    a. Compute the mean number of website visits on week days and weekend days.
    b. Compute 95% confidence intervals for both means.
    c. Test the marketing department's claim using $\alpha = 0.05$.
    d. Test the marketing department's claim using $\alpha = 0.10$.
    e. What is the lowest level of significance under which marketing department's claim remains true?

4. The file **ch2qa4.xls** contains data on the profits of movies, in millions of dollars, from dramas and comedies that had their premieres over the summer. As a film producer you need to decide what kind of movies would you prefer to produce for summer premieres.
    a. Compute the mean profits for dramas and comedies.
    b. Compute 95% confidence intervals for both means.
    c. Test whether mean profits for those two types of movies are different using $\alpha = 0.05$.
    d. Test whether comedies bring more profits using $\alpha = 0.05$.
    e. Test whether comedies bring more profits using $\alpha = 0.10$.

Exam questions

1. A mail order company wants to introduce a new incentive scheme for its sales agents. They tested the new scheme on 25 agents. In the file **ch2q1.xls** you can

find the data on the number of orders that were placed with each of those agents during one day.

a. Compute the mean number of orders that were placed when agents had no additional incentive and when additional incentives were present.
b. Did the mean increased?
c. Compute 95% confidence intervals for both means. Do they overlap?
d. Test, using $\alpha = 0.05$, whether the new incentive scheme increases the mean number of orders that are placed with an agent.
e. Can you predict the result of the test for $\alpha = 0.10$ without any computations? Why?

2. A publishing company decided to cut costs. Every book is published both as hardcover and paperback. The publisher wants to publish all books either as hardcover or paperback but not both. As a consultant you are supposed to determine which format is more profitable for the company. In the file **ch2q2.xls** you will find the data on sales of both hardcover and paperback editions.
    a. Suppose that profit from each paperback and hardcover book are the same. Compute the mean sales for paperback and hardcover books. Which is higher?
    b. Find the 95% confidence intervals for both means.
    c. At a 5% level of significance test whether sales of paperback editions are higher than sales of hardcover editions.
    d. If the profits from both editions are the same should the company publish only paperback editions or only hardcover editions?
    e. Now suppose that hardcover editions bring 10% higher profits. Test whether your conclusions from part c. still hold true.