

ELEMENTARY STATISTICS: SKILLS PRACTICE EXAM 3- LESSONS 7,8, 9, 10*

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Questions 1, 2, and 3 refer to the following:

In a study of a sample of 35 Computer Science majors and 40 Business majors, the average number of science fiction books each group read per year was recorded. The Computer Science majors read an average of 11 books with a standard deviation of 4 books. The Business majors read an average of 9 books with a standard deviation of 4.5 books. We are interested in whether the average number of science fiction books read by the Computer Science majors is the same as the number read by the Business majors. CS = Computer Science majors B = Business majors

Exercise 1

(Solution on p. 7.)

The alternate hypothesis is:

- a. $m_{CS} = m_B$
- b. $m_{CS} \neq m_B$
- c. $m_{CS} < m_B$
- d. $m_{CS} > m_B$

Exercise 2

(Solution on p. 7.)

The exact distribution for the test is:

- a. Normal
- b. Student-t with $df \gg 72.9775$
- c. Exponential
- d. Uniform

Exercise 3

(Solution on p. 7.)

The p-value is

- a. 0.0452
- b. 2.0376
- c. 0.0226
- d. 0

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Questions 4 and 5 refer to the following:

Suppose that a random survey of 10 teenagers found that the average amount of time they spend on the Internet each day is 3.2 hours with a sample standard deviation of 0.78 hours.

Exercise 4*(Solution on p. 7.)*

The point estimate of the population average amount of time teenagers spend on the Internet each day is

- a. 0.78 hours
- b. 32 hours
- c. 3.2 hours
- d. unknown

Exercise 5*(Solution on p. 7.)*

An 87% confidence interval for the average amount of time a teenager spends on the Internet each day would be

- a. (2.71, 3.68)
- b. (2.83, 3.57)
- c. (2.64, 3.76)
- d. (2.79, 3.61)

Exercise 6*(Solution on p. 7.)*

Which of the following is TRUE about a 99% confidence interval for the true average amount of time that teenagers spend on the Internet each day?

- I. We are 99% confident that the true average time that teenagers spend on the Internet per day lies within the confidence interval.
- II. The confidence interval contains 99% of the data values collected.
- III. 99% of all the confidence intervals constructed this way contain the true average amount of time teenagers spend on the Internet each day.

- a. I, II, and III
- b. I and II
- c. I and III
- d. I only

Questions 7 and 8 refer to the following:

Suppose a random survey of 600 registered voters revealed that only 39% actually voted in the last primary election. We are interested in the population proportion of registered voters who actually voted in the last primary election.

Exercise 7*(Solution on p. 7.)*

The margin of error (error bound) for a 92% confidence interval for the true proportion of registered voters who actually voted in the last primary election is

- a - 0.0176
- b - 0.3900
- c - 0.3551
- d - 0.0349

Exercise 8*(Solution on p. 7.)*

Suppose you want to redo the survey of registered voters to see how many voted in the last election but this time you survey 1000 registered voters and find 340 voted in the last election. If the confidence level is maintained at 92% what happens to the confidence interval.

- The confidence interval gets wider.
- The confidence interval gets narrower.
- The confidence interval stays the same.
- The confidence interval cannot be calculated.

Exercise 9*(Solution on p. 7.)*

A study of a certain brand of AA batteries yielded a sample mean lifetime of 450 minutes with a sample standard deviation of 92 minutes. A hypothesis test was performed using the following hypotheses:

$$H_o : m = 480$$

$$H_a : m < 480$$

The type I error for this hypothesis test is:

- to conclude that the average battery lifetime is less than 480 minutes when, in reality, it is equal to 480 minutes
- to conclude that the average battery lifetime is equal to 480 minutes when, in reality, it actually is equal to 480 minutes
- to conclude that the average battery lifetime is equal to 480 minutes when, in reality, it is less than 480 minutes
- to conclude that the average battery lifetime is greater than 480 minutes when, in reality, it is equal to 480 minutes

Exercise 10*(Solution on p. 7.)*

The null hypothesis is “the percentage of men who score 45 points or more (out of 50 points) on a statistics test at De Anza College is the same as the percentage of women who score 45 points or more.” The alternate hypothesis is “the percentage of men who score 45 points or more (out of a 50 point test) on a statistics test at De Anza College is more than the percentage of women who score 45 points or more.”

The appropriate hypothesis test to perform and distribution to use is

- a test of two population proportions, independent groups; Student-t distribution
- a test of a single population proportion; Normal distribution
- a test of two population means, independent groups; Normal distribution
- a test of two population proportions, independent groups; Normal distribution

Questions 11 through 13 refer to the following: In a study of vehicle safety, 15 minivans were crash tested and the repair costs for each of the 15 minivans were recorded. For these 15 minivans, the average repair cost was \$1786 and the standard deviation was \$937 (based on data from the Highway Loss Data Institute.) Suppose that you want to test the hypothesis that the average repair cost is under \$2000. Assume that the underlying population of repair costs follows a normal distribution.

Exercise 11*(Solution on p. 7.)*

The correct null hypothesis for this test is

- $m = 1786$
- $m < 2000$
- $m = 2000$

- d. $m < 2000$

Exercise 12*(Solution on p. 7.)*

At a 5% level of significance (a), the correct decision for this hypothesis test is

- a. reject H_o because a is more than the p-value.
- b. reject H_o because a is less than the p-value.
- c. do not reject H_o because a is more than the p-value.
- d. do not reject H_o because a is less than the p-value.

Exercise 13*(Solution on p. 7.)*

The appropriate distribution for this test is

- a. Normal with standard deviation \$937
- b. t with degrees of freedom = 15
- c. t with degrees of freedom = 14
- d. Normal with standard deviation \$241.93

For problems 14 and 15: Buses on a particular route stop in front of De Anza College every 20 minutes between 3:00 p.m. and 1:00 a.m. The waiting times are equally likely. We asked the 33 people waiting at 6:45 p.m. how long they had been waiting, and then calculated the average wait time for those people.

Exercise 14*(Solution on p. 7.)*

The distribution of the average wait times is:

- a. $N(10, 1.0050)$
- b. $U(0, 20)$
- c. $N(10, 5.7735)$
- d. $Exp(1/20)$

Exercise 15*(Solution on p. 7.)*

The probability that the average wait time is no more than 15 minutes is

- a. 1
- b. 0.7500
- c. 0.7769
- d. 0

Exercise 16*(Solution on p. 7.)*

Which probability statement best describes the graph? The horizontal axis has the label \bar{X} .

- a. $P(\bar{X} > 6)$
- b. $P(\bar{X} < 3)$
- c. $P(\bar{X} > 6 \text{ or } \bar{X} < 3)$
- d. $P(3 < \bar{X} < 6)$

Questions 17 and 18 refer to the following: A radio news story claimed that half of all U.S. adults have Internet access. In a national poll about Internet usage (The Pew Internet Project), 12,638 U.S. adults were surveyed and it was found that 6413 of those surveyed had Internet access. At a 5% level of significance, perform a hypothesis test to test the claim made by the radio news story.

Exercise 17*(Solution on p. 7.)*

The hypothesis test is:

- a. right - tailed
- b. left - tailed
- c. two - tailed
- d. no-tailed

Exercise 18*(Solution on p. 7.)*

The correct conclusion is:

- a. The percentage of U.S. adults that have Internet access is not one-half.
- b. more than half of all U.S. adults have Internet access.
- c. half of all U.S. adults have Internet access.
- d. less than half of all U.S. adults have Internet access.

Questions 19 - 21 refer to the following: An organic fertilizer and a conventional chemical fertilizer are tested to determine if the organic fertilizer produces more blossoms per stalk. 43 pairs of seed (the pair of seeds come from the same parent plant) are treated. One seed is treated with the organic fertilizer and the other seed is treated with the conventional chemical fertilizer. After a growing season of identical watering and sunlight, the number of blossoms on each stalk in a matched pair is recorded. For each pair, the difference in the number of blossoms per stalk (organic fertilizer plant blossoms – conventional chemical fertilizer plant blossoms) is computed. $\bar{x}_d = 2.2$ $sd = 5.3$ $n = 43$

Exercise 19*(Solution on p. 7.)*

What type of hypothesis test is conducted?

- a. Test of a single population mean
- b. Test of two population proportions, independent groups
- c. Matched or Paired Samples
- d. Test of two population means, independent groups

Exercise 20*(Solution on p. 7.)*

Select the appropriate alternate hypothesis.

- a. $\mu_d \leq 0$
- b. $\mu_d > 0$
- c. $\mu_d > 2.2$
- d. $\mu_d \leq 2.2$

Exercise 21*(Solution on p. 7.)*

What is the correct conclusion?

- a. The organic fertilizer does result in more blossoms per stalk
- b. The organic fertilizer does not result in more blossoms per stalk.
- c. The organic fertilizer results in the same number of blossoms per stalk
- d. The conventional chemical fertilizer does result in more blossoms per stalk

Problems 22 – 24 refer to the following: Based on data from the 2000 Census the average age of a Baldwin County, Alabama resident is 39 years with a standard deviation of 22.6. The data is normally distributed.

Exercise 22*(Solution on p. 7.)*

The median age, in years, is:

- a. 39
- b. 22.6
- c. 19.5

d.. There is not enough information.

Exercise 23*(Solution on p. 7.)*

If 100 residents are surveyed, the IQR for the average age is:

- a. 0. 30
- b. 30.5
- c. 3.04
- d.. There is not enough information.

Questions 24 – 25 refer to the following: Students doing a statistics project at Central City College found that the amount of time a teenager spends cleaning his/her room each week is exponentially distributed with a mean of 20 minutes.

Exercise 24*(Solution on p. 7.)*

What is the probability that 50 randomly selected teenagers spend, on average, between 15 and 30 minutes cleaning their rooms each week?

- a. 0.7500
- b. 0.2902
- c. 0.2492
- d. 0.9612

Exercise 25*(Solution on p. 7.)*

Find the 70th percentile for the average amount of time 50 teenagers spend cleaning their rooms each week.

- a. 70
- b. 21.5
- c. 30.5
- d. 7.1

Solutions to Exercises in this Module

Solution to Exercise (p. 1)

B

Solution to Exercise (p. 1)

C

Solution to Exercise (p. 1)

A

Solution to Exercise (p. 2)

C

Solution to Exercise (p. 2)

D

Solution to Exercise (p. 2)

C

Solution to Exercise (p. 2)

D

Solution to Exercise (p. 3)

B

Solution to Exercise (p. 3)

A

Solution to Exercise (p. 3)

D

Solution to Exercise (p. 3)

C

Solution to Exercise (p. 4)

D

Solution to Exercise (p. 4)

C

Solution to Exercise (p. 4)

A

Solution to Exercise (p. 4)

A

Solution to Exercise (p. 4)

D

Solution to Exercise (p. 4)

C

Solution to Exercise (p. 5)

C

Solution to Exercise (p. 5)

C

Solution to Exercise (p. 5)

B

Solution to Exercise (p. 5)

A

Solution to Exercise (p. 5)

A

Solution to Exercise (p. 6)

C

Solution to Exercise (p. 6)

D

Solution to Exercise (p. 6)
B