

KING FAHD UNIVERSITY OF PETROLEUM & MINERALS  
MATHEMATICS DEPARTMENT

STAT 211 BUSINESS STATISTICS I  
Semester 233, First Exam  
July. 10, 2022

Time allowed 90 minutes

Name: \_\_\_\_\_ ID #: \_\_\_\_\_

Section #: \_\_\_\_\_ Serial #: \_\_\_\_\_

Important Instructions:

Check that this exam has 20 questions

- All types of mobile phones or smart watches are NOT allowed during the examination.
- Use HB 2.5 pencils only.
- Use a good eraser. DO NOT use the erasers attached to the pencil.
- Write your name, ID number and Section number on the examination paper and in the upper left corner of the answer sheet.
- When bubbling your ID number and Section number, be sure that the bubbles match with the numbers that you write.
- The Test Code Number is already bubbled in your answer sheet. Make sure that it is the same as that printed on your question paper.
- When bubbling, make sure that the bubbled space is fully covered.
- When erasing a bubble, make sure that you do not leave any trace of penciling
- Formula sheet will be provided to you in exam. You are not allowed to bring, with you, formula sheet or any other printed/written paper.

You are the manager of a restaurant for a fast-food franchise. Last month, the mean waiting time at the drive-through window for branches in your region, as measured from the time a customer places an order until the time the customer receives the order, was 3.7 minutes. You select a random sample of 16 orders. The sample mean waiting time is 3.37 minutes, with a sample standard deviation of 0.8 minute. (Ex.9.24)

Based on this information, answer the next four questions

1. what distribution will you use to test your hypothesis?

- a. t-student distribution with 15 degrees of freedom
- b. binomial distribution
- c. normal distribution
- d. t-student distribution with 16 degrees of freedom
- e. Chi-square distribution

2. what is the appropriate alternative hypothesis is

- a.  $H_1: \mu \neq 3.7$
- b.  $H_1: \bar{x} \neq 3.7$
- c.  $H_1: \mu > 3.7$
- d.  $H_1: \mu \neq 3.37$
- e.  $H_1: \bar{x} \neq 3.37$

3. what is the value of test statistic?

- a. -1.65
- b. 1.65
- c. -0.4125
- d. 0.4125
- e. 0

4. we reject  $H_0$  if the absolut value of test statistic is more than \_\_\_\_\_

- a. 2.131
- b. 1.746
- c. 1.96
- d. 1.64
- e. 1.753

The telephone company wants to investigate the desirability of beginning a marketing campaign that would offer customers the right to purchase an additional telephone line at a substantially reduced installation cost. The campaign will be initiated if there is evidence that more than 20% of the customers would consider purchasing an additional telephone line if it were made available at a substantially reduced installation cost. A random sample of 500 households is selected. The results indicate that 117 of the households would purchase the additional telephone line at a reduced installation cost. (Ex.9.59)

Based on this information, answer the next three questions

5. The alternative hypothesis is

- a.  $H_1: \pi > 0.2$
- b.  $H_1: \hat{p} > 0.2$
- c.  $H_1: \mu > 0.2$
- d.  $H_1: \pi \neq 0.2$
- e.  $H_1: \pi \geq 0.2$

6. The sample proportion for the customers who **do not** purchase an additional telephone line if it were made available at a substantially reduced installation cost is

- a. 0.766
- b. 0.234
- c. 0.20
- d. 0.80
- e. 0.50

7. Given that the test statistic is 1.9, then the observed level of significance of the test is equal to

- a. 0.02872
- b. 0.97128
- c. 0.96327
- d. 0.03673
- e. 0.05744

The following information is available for two samples selected from independent normally distributed populations:

	First sample	Second sample
Sample size	8	16
Sample standard deviation	4	5

Based on this information, answer the next **three** questions. (Ex.10.2)

8. What distribution will you use to test the claim that there is no difference between the variances,
- F distribution with 15 and 7 degrees of freedom
  - Student-t distribution with 22 degrees of freedom
  - normal distribution
  - F distribution with 7 and 15 degrees of freedom
  - Student-t distribution with 20 degrees of freedom
9. To test the claim that there is no difference between the variances, the test statistic equal to
- 1.5625
  - 1.25
  - 1.2352
  - 1.5259
  - 1.4091
10. To test the claim that there is no difference between the variances, which of the following is true
- The critical value equal to 4.57 and we conclude that there is no difference between the variances.
  - The critical value equal to 3.29 and we conclude that there is no difference between the variances.
  - The critical value equal to 3.51 and we conclude that there is no difference between the variances.
  - The critical value equal to 2.63 and we conclude that there is no difference between the variances.
  - The critical value equal to 1.68 and we conclude that there is difference between the variances.

Assume that you have a sample of size 8, with a mean 42 and a standard deviation 4, and you have an independent sample of size 16 from another population with a mean of 34 and a standard deviation 5. Assume that both samples selected form independent normally populations with equal variances.

Based on this information, answer the next **three** questions.

11. If you wish to test  $H_0: \mu_1 = \mu_2$ , what is the value of the pooled-variance for the test

- a. 22.136
- b. 4.705
- c. 20.292
- d. 4.505
- e. 21.173

$$s_p^2 = \frac{7(4^2) + 16(5^2)}{8 + 16 - 2} = 22.136$$

12. At 1% level of significance, what is the critical value for testing  $H_0: \mu_2 \geq \mu_1$  vs.  $H_1: \mu_2 < \mu_1$

- a. -2.508
- b. -2.518
- c. -1.721
- d. -1.725
- e. -2.086

$$t_{0.01, 8+16-2} = -t_{0.01, 22} = -2.508$$

13. At 1% level of significance, for testing  $H_0: \mu_2 \geq \mu_1$  vs.  $H_1: \mu_2 < \mu_1$ , which of the following statements is true:

- a. Since the critical value is more than the test statistic; reject  $H_0$
- b. Since the critical value is more than the test statistic; don't reject  $H_0$
- c. Since the critical value is less than the test statistic; don't reject  $H_0$
- d. Since the critical value is less than the test statistic; reject  $H_0$
- e. we cannot tell

14. When testing  $H_0: \pi_1 - \pi_2 \leq 0$  vs.  $H_1: \pi_1 - \pi_2 > 0$ , the observed value of the test statistic was found to be 2.13. The p-value for this test is

- a. 0.0166
- b. 0.0332
- c. 0.9834
- d. 0.9668
- e. 0.9750

15. A manufacturer of candy must monitor the temperature at which the candies are baked. Too much variation will cause inconsistency in the taste of the candy. Past records show that the standard deviation of the temperature has been 1.2 °F. A random sample of 30 batches of candy is selected, and the sample standard deviation of the temperature is 2.1 °F. To test the claim that the population standard deviation has increased above 1.2 °F, which of the following is true

- a. Since the test statistic of  $\chi_0^2 = 88.8125$  is more than the critical value 42.557, reject  $H_0$ . There is sufficient evidence to conclude that the standard deviation of the oven temperature has increased above 1.2 °F.
- b. Since the test statistic of  $\chi_0^2 = 88.8125$  is more than the critical value 42.557, don't reject  $H_0$ . There is sufficient evidence to conclude that the standard deviation of the oven temperature has increased above 1.2 °F.
- c. Since the test statistic of  $\chi_0^2 = 88.8125$  is more than the critical value 42.557, reject  $H_0$ . There is insufficient evidence to conclude that the standard deviation of the oven temperature has increased above 1.2 °F.
- d. Since the test statistic of  $\chi_0^2 = 88.8125$  is more than the critical value 42.557, don't reject  $H_0$ . There is insufficient evidence to conclude that the standard deviation of the oven temperature has increased above 1.2 °F.
- e. T Since the test statistic of  $\chi_0^2 = 88.8125$  is more than the critical value 42.557, maybe we reject the null hypothesis maybe not.