

KING FAHD UNIVERSITY OF PETROLEUM & MINERALS
MATHEMATICS DEPARTMENTSTAT 212 BUSINESS STATISTICS II
Semester 231, Second Exam

November 09, 2023

Time allowed 100 minutes

Name: _____ ID #: _____

Section #: _____

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.

A bank conducted a survey to know how people feel about online discounts tailored to their individual interests. The following table shows the results for the survey:

How people feel?	Age group			Total
	18 – 24 years	25 – 34 years	35 – 49 years	
Opposed	20	38	47	105
Approve	30	12	3	45
Total	50	50	50	150

The bank wants to test if there is evidence of a difference among the proportions of different age groups who oppose discounts tailored to their interests, at 5% level of significance.

Using the above information answer the following **4** questions

1. What is expected frequency for people who are in the 25 – 34 years age group and approve of the online discounts that are tailored to their individual interest?

- A. 15
- B. 35
- C. 70
- D. 12
- E. 38

2. To test if there is evidence of a difference in proportion among the proportions of different age groups who oppose discounts tailored to their interests. **The test statistic is:**

- A. 36.00
- B. 22.24
- C. 20.00
- D. 16.45
- E. 10.04

3. To test if there is evidence of a difference in proportion among the proportions of different age groups who oppose discounts tailored to their interests, at 5% level of significance. **The critical value is:**

- A. 5.9915
- B. 7.3778
- C. 3.8415
- D. 5.0239
- E. 7.8147

4. To test if there is evidence of a difference in proportion among the proportions of different age groups who oppose discounts tailored to their interests, at 5% level of significance. **The conclusion is:**

- A. Reject H_0 . There is evidence of a difference in the proportions among the age groups who oppose discounts tailored to their interests.
- B. Don't reject H_0 . There is no evidence of a difference in the proportions among the age groups who oppose discounts tailored to their interests.
- C. Don't reject H_0 . There is evidence of a difference in the proportions among the age groups who oppose discounts tailored to their interests.
- D. Reject H_0 . There is no evidence of a difference in the proportions among the age groups who oppose discounts tailored to their interests.
- E. The test is inconclusive.

The CEO of a large metropolitan health-care facility would like to assess the effect of the recent implementation of the Six Sigma management approach on customer satisfaction. A random sample of 100 patients is selected from a list of patients who were at the facility the past week and also a year ago:

Satisfied Last Year	Satisfied Now		Total
	Yes	NO	
YES	65	12	77
NO	15	8	23
Total	80	20	100

At the 2.5% level of significance, to test that there is evidence that satisfaction was **lower** last year, prior to introduction of Six Sigma management

Based on this information, answer the next **4** questions

5. The appropriate null hypothesis is:

- A. $H_0: \pi_{prior} \geq \pi_{after}$
- B. $H_0: \pi_{prior} = \pi_{after}$
- C. $H_0: \pi_{prior} \leq \pi_{after}$
- D. $H_0: \pi_{prior} \neq \pi_{after}$
- E. $H_0: \pi_{prior} > \pi_{after}$

6. The proportion of patients that weren't satisfied last year is:

- A. 0.23
- B. 0.77
- C. 0.80
- D. 0.20
- E. 0.5

7. What is the value of test statistic?

- A. -0.58
- B. 5.20
- C. -5.20
- D. 15.59
- E. -15.59

8. The p-value for the test is:

- A. 0.2810
- B. 0.7190
- C. 1
- D. 0
- E. 0.3156

An agent for a residential real estate company in a large city would like to be able to predict the monthly rental cost (in \$) for apartments, based on the size of an apartment, as defined by square footage. The agent selects a sample of 25 apartments in a particular residential neighborhood and gathers the following data:

$$\sum x = 27400, \sum y = 34825, \sum x^2 = 33242628, \sum y^2 = 51788125, \sum xy = 40608800$$

Based on this information, answer the next 5 questions

9. The mean change in the rental cost for one square footage increase in the size of the apartment is:

- A. 0.75978
- B. 1.06513
- C. 560.27652
- D. 0.01211
- E. 3.21190

10. The estimated intercept is:

- A. 560.28
- B. 0.76
- C. 10.07
- D. 422.90
- E. 321.10

11. The percentage of variation in the rental cost that is explained by the variation in the size of the apartment is:

- A. 56.59%
- B. 72.24%
- C. 67.90%
- D. 38.21%
- E. 98.78%

12. Predict the monthly rent for an apartment that has 1000 square feet

- A. \$1320.06
- B. \$636.26
- C. \$8158.28
- D. \$1625.38
- E. \$833.20

13. The standard error of the estimate is:

- A. 248.7
- B. 14.3
- C. 312.7
- D. 101.3
- E. 304.9

An owner of a supermarket developed a linear regression model between the waiting time at the counter and the number of customers (where y is the waiting time and x is the number of customers). The model is given by:

$$\hat{y} = -0.448 + 0.1285 X$$

With the following summary statistic:

$$Se(\hat{\beta}_1) = 0.013, S_{yy} = 46.632, R^2 = 0.7873, n = 30, \bar{x} = 20.3, S_{xx} = 2224.3$$

Based on this information, answer the next 5 questions

14. The estimated correlation between the number of customers and the waiting time is:
- A. 0.887
 - B. -0.887
 - C. 0.787
 - D. -0.787
 - E. 0.923
15. To test that the linear relationship between the number of customers and the waiting time is significant, at 2% level of significance. **The test statistic** is:
- A. 9.8846
 - B. -34.46
 - C. 1.127
 - D. 8.873
 - E. 13.101
16. To test that the linear relationship between the number of customers and the waiting time is significant, at 2% level of significance. **The critical value** is:
- A. 2.4671
 - B. 2.0484
 - C. 2.4573
 - D. 2.0423
 - E. 1.8813
17. Predict the waiting time when the number of customers is 20.
- A. 2.122 minutes
 - B. 3.018 minutes
 - C. 3.560 minutes
 - D. 1.543 minutes
 - E. 2.670 minutes
18. A 98% confidence interval for the mean waiting time when the number of customers is 20
- A. [1.8538, 2.3902]
 - B. [1.4345, 2.5590]
 - C. [1.1210, 2.6443]
 - D. [-1.8538, 2.3902]
 - E. [2.0112, 3.2331]

19. If we use the χ^2 method of analysis to test for the differences among 6 proportions, the degrees of freedom are equal to

- A. 5
- B. 4
- C. 6
- D. n-1
- E. 1

20. If we use the χ^2 method of analysis to test for the differences among 4 proportions, and the test statistic was found to be 7.8147. The p-value is:

- A. 0.05
- B. 0.025
- C. Between 0.01 and 0.025
- D. Between 0.005 and 0.01
- E. Between 0.1 and 0.2