KING FAHD UNIVERSITY OF PETROLEUM & MINERALS
MATHEMATICS DEPARTMENT

STAT 212 BUSINESS STATISTICS II
Semester 231, First Exam

September 28, 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.

1. If the Type I error (α) for a given test is to be decreased, then for a fixed sample size n:

   A. the Type II error (β) will increase.
   B. the Type II error (β) will also decrease.
   C. the power of the test will increase.
   D. a one-tail test must be utilized.
   E. None of the above.

2. If the probability of type I error is (α) and the probability of type II error is (β). Then the probability of rejecting a false null hypothesis is given by?

   A. 1 - β
   B. 1 - α
   C. α
   D. β
   E. α - β

3. If you have two samples of sizes $n_1 = 12$ and $n_2 = 15$ with the following standard deviations $S_1 = 4$ and $S_2 = 20$ and we want to test the difference in the mean of the two populations assuming the variances are not equal. What will be the degrees of freedom?

   A. 15
   B. 25
   C. 27
   D. 23
   E. No need for the degrees of freedom

4. A The marketing manager needs an estimate of the standard deviation. Suppose he took a sample of size 15 and found the sample standard deviation to be $9.2. To test that the standard deviation is less than $12 at 1% level of significance, the critical value is:

   A. 4.6604
   B. 29.141
   C. 31.319
   D. 4.0747
   E. 5.2294

A manager of a fast-food restaurant wants to determine whether the waiting time to place an order has changed in the past month from its previous population mean value of 4.5 minutes. assume that the population is normally distributed, with a population variance of 4 minutes. A sample of 25 orders were selected with sample mean is 5.1 minutes. At 2.5% level of significance, to test that the mean is different from 4.5 minutes.

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

5. what distribution will you use to test this hypothesis?

   A. normal distribution
   B. t-student distribution with 24 degrees of freedom
   C. t-student distribution with 23 degrees of freedom
   D. t-student distribution with 25 degrees of freedom
   E. Chi-square distribution

6. What is the appropriate **null** hypothesis:
   A. $H_o: \mu = 4.5$
   B. $H_1: \mu = 4.5$
   C. $H_o: \mu \neq 4.5$
   D. $H_1: \bar{x} = 5.1$
   E. $H_1: \bar{x} \neq 5.1$

7. what is the value of test statistic?

   A. 1.5
   B. –1.5
   C. – 0.75
   D. 0.75
   E. – 1.25

8. The p-value for the test is:

   A. 0.1336
   B. 0.0668
   C. 0.9332
   D. 0.0062
   E. 0.0042

9. The decision of the test is:
   A. There is no evidence that the mean is different from 4.5 minutes.
   B. There is evidence that the mean is different from 4.5 minutes.
   C. There is no evidence that the mean is different form 5.1 minutes
   D. There is evidence that mean is different from 5.1 minutes
   E. There is evidence that the mean is between 4.5 and 5.1 minutes.

A manufacturing manager assumes that the proportion of defective items produced is more than 20%. A random sample was selected and out of 400 items, 90 were defective. He decides to test that the proportion of defective items produced is more than 20%, at 2.5% level of significance.

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

10. What is the sample proportion of non-defective items

A. 0.775
B. 0.225
C. 0.2
D. 0.8
E. 0.9

11. what is the value of test statistic?

A. 1.25
B. –1.25
C. – 0.125
D. 0.775
E. 0.225

12. What is the p-value for the test?

A. 0.1056
B. 0.8944
C. 0.025
D. 0.975
E. 0.0154

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According to a recent study, when shopping online for luxury goods, men spend a mean of $1500 , whereas women spend a mean of $1800. Suppose that the study was based on a sample of 25 men and 25 females, and the standard deviation of the amount spent was $100 for men and $110 for women. Assuming equal variances: if we want to determine whether the mean amount spent is higher for women than for men at 5% level of significance.

Based on this information, answer the next four questions

13. The null and alternative hypothesis for the test are:

A. $H_o: \mu_m \geq \mu_w \quad vs \quad H_1: \mu_m < \mu_w$
B. $H_o: \mu_m = \mu_w \quad vs \quad H_1: \mu_m \neq \mu_w$
C. $H_o: \mu_m \leq \mu_w \quad vs \quad H_1: \mu_m > \mu_w$
D. $H_o: \mu_m \geq \mu_w \quad vs \quad H_1: \mu_m > \mu_w$
E. $H_o: \mu_m \geq \mu_w \quad vs \quad H_1: \mu_m \neq \mu_w$

14. what is the value of the pooled variance?

A. 11050.00
B. 11510.42
C. 105.00
D. 100.80
E. 110.90

15. The test statistic is equal to:

A. -10.09
B. -5.31
C. -1.52
D. 5.31
E. 7.81

16. The critical value is equal to:

A. -1.6772
B. -2.0106
C. 2.0106
D. 1.2994
E. -1.2994

A professor would like to determine whether there is **more** variability in the final exam scores of students who are not majoring in accounting than for students who are majoring in accounting at 2.5% level of significance. Random samples of 13 non-accounting majors and 16 accounting majors are selected from the professor's class roster in his large lecture, and the following results are computed based on the final exam scores:

Non-accounting major: $n_1 = 13, \quad S_1^2 = 81$

Accounting major: $n_2 = 16, \quad S_2^2 = 25$

Based on this information, answer the next **four** questions:

17. The alternative hypothesis is given by:

A. $H_1: \sigma_1^2 > \sigma_2^2$
B. $H_1: \sigma_1^2 \geq \sigma_2^2$
C. $H_1: \sigma_1^2 \neq \sigma_2^2$
D. $H_1: \sigma_1^2 < \sigma_2^2$
E. $H_1: \sigma_1^2 \leq \sigma_2^2$

18. To test the claim that the variability in the scores of non-accounting students is more than the variability in the scores of accounting students at 2.5% level of significance, **the degrees of freedom are**:

A. 12 & 15
B. 15 & 12
C. 13 & 16
D. 16 & 13
E. 11 & 14

19. To test the claim that the variability in the scores of non-accounting students is more than the variability in the scores of accounting students at 2.5% level of significance, **the critical value is**:

A. 2.963
B. 3.177
C. 2.475
D. 3.771
E. 2.369

20. To test the claim that the variability in the scores of non-accounting students is more than the variability in the scores of accounting students at 2.5% level of significance, **the decision and conclusion are**:

A. Reject H_o; There is evidence that the variability of the scores of non-accounting students is more than the variability of the scores of accounting students.
B. Don't reject H_o; There is evidence that the variability of the scores of non-accounting students is more than the variability of the scores of accounting students.
C. Reject H_o; There is **NO** evidence that the variability of the scores of non-accounting students is more than the variability of the scores of accounting students.
D. Don't reject H_o; There is **NO** evidence that the variability of the scores of non-accounting students is more than the variability of the scores of accounting students.
E. We cannot tell from the information given.