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FACULTY OF APPLIED SCIENCES AND MATHEMATICS EDUCATION
DEPARTMENT OF MATHEMATICS EDUCATION

END OF SECOND SEMESTER EXAMINATION, AUGUEST, 2021

COURSE CODE	**MAT 243**
COURSE TITLE	**FURTHER STATISTICS**
DURATION	**TWO HOURS**
LECTURER	**DR. YARHANDS DISSOU ARTHUR**
INSTRUCTION(S)	**ANSWER ALL QUESTIONS IN THE QUESTION PAPER**

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1. A goodness of fit test can be used to determine whether a particular multinomial distribution provides a good description of a population
   A. TRUE
   B. FALSE
2. In conducting a goodness of fit test, the observed frequency for one or more categories may be less than 5.
   A. TRUE
   B. FALSE
3. The chi square distribution is used in conducting a contingency table test
   A. TRUE
   B. FALSE
4. In contingency table test of independence, the number of rows must be equal to the number of columns
   A. TRUE
   B. FALSE
5. In conducting either a goodness of fit or contingency table tests the expected frequency for each cell must be at least 5.
   A. TRUE
   B. FALSE
6. In conducting either a goodness of fit or contingency table tests the larger the differences between the observed and expected frequencies the more likely it is that the null hypothesis will be rejected
   A. TRUE
   B. FALSE
7. The appropriate number of degrees of freedom for a contingency table test is given by the product of the number of rows times the number of columns
   A. TRUE
   B. FALSE
8. The frame for a sample survey refers to the care exercised in designing the questionnaire
   A. TRUE.
   B. FALSE

9. The only assumption required for the analysis of variance is that the response variable is normally distributed
   A. TRUE
   B. FALSE
10. The degree of freedom associated with the sum of squares between treatment is the same as the number of treatments
   A. TRUE
   B. FALSE
11. The within treatment estimate of the population variance is called the mean square treatment due to error
   A. TRUE
   B. FALSE
12. In a completely randomised design, the sum of square due to error has a number of degrees of freedom equal the total sample size minus the number of treatments minus 1.
   A. TRUE
   B. FALSE
13. In a completely randomized design, the degrees of freedom associated with the total sum od squares is the sum of the degrees of freedom for Sum of square treatment and the degrees of freedom for sum of square error.
   A. TRUE
   B. FALSE
14. Whenever randomised block design is used the F test should not be used.
   A. TRUE
   B. FALSE
15. If the null hypothesis that k population means are equal is rejected, we can then use a chi square test to determine which individual means differ
   A. TRUE
   B. FALSE
16. In a two-factor factorial experiment, the total sum of squares is partitioned into two components main effect factor A and main effect factor B.
   A. TRUE
   B. FALSE
17. In a factorial experiment the number of levels of factor A must be equal to the number of level of factor B.
   A. TRUE
   B. FALSE

18. The precision in the sample survey refers to the care exercised in designing the questionnaire
   A. TRUE
   B. FALSE
19. Judgement sampling is the type of nonprobabilistic sampling
   A. TRUE
   B. FALSE
20. Simple random sampling is a form of probabilistic sampling
   A. TRUE.
   B. FALSE

21. Stratified random sampling works well in situations where the variance between strata is large relative to the variance within strata.
    A. TRUE
    B. FALSE
22. Cluster sampling is often used when controlling travel cost is an important consideration in administering a survey
    A. TRUE
    B. FALSE
23. Prior to using systematic sampling, the population must be stratified
    A. TRUE
    B. FALSE
24. In completely randomised design the treatment must be randomly assigned to the experimental units
    A. TRUE
    B. FALSE
25. The analysis of variance can be used to test the null hypothesis that k population means are equal
    A. TRUE
    B. FALSE
26. In computing the between treatment estimates of the population variance, we cannot assume that the null hypothesis is true
    A. TRUE
    B. FALSE

27. A simple random sample of 36 elements from a population of 100 elements yielded $\bar{x} = 720$ and $s = 24$. Calculate an estimate of the standard error of the mean.
    A. 4.00
    B. 3.20
    C. 10.24
    D. 2.56

28. A simple random sample of 36 elements from a population of 100 elements yielded $\bar{x} = 720$ and $s = 24$. An approximate 95% confidence interval estimate for the population mean is
    A. 713.60 to 726.40
    B. 696 to 744
    C. 672 to 768
    D. 716.80 to 723.20

29. A simple random sample of 36 elements from a population of 100 elements yielded $\bar{x} = 720$ and $s = 24$. An approximate 95% confidence interval estimate for the population Total is
    A. 70,000 to 74,000
    B. 71,200 to 72,800
    C. 71,680 to 72,320
    D. 71,600 to 72,300

A stratified random sample provided these results:

$N_1 = 100,\ n_1 = 30, \bar{p}_1 = 0.2; N_2 = 150,\ n_2 = 40, \bar{p}_2 = 0.5; N_3 = 180,\ n_3 = 45, \bar{p}_3 = 0.4$

30. Find the number of elements in the population
    A. 115
    B. 450
    C. 545
    D. 430

A stratified random sample provided these results:

$N_1 = 100,\ n_1 = 30, \overline{p}_1 = 0.2; N_2 = 150,\ n_2 = 40, \overline{p}_2 = 0.5; N_3 = 180,\ n_3 = 45, \overline{p}_3 = 0.4$

31. Find the point estimate of the population proportion
    A. 0.200
    B. 0.500
    C. 0.293
    D. 0.305

A stratified random sample provided these results:

$N_1 = 100,\ n_1 = 30, \overline{p}_1 = 0.2; N_2 = 150,\ n_2 = 40, \overline{p}_2 = 0.5; N_3 = 180,\ n_3 = 45, \overline{p}_3 = 0.4$

32. An estimate of the standard error of $\overline{p}_{st}$ is closest to
    A. 0.02
    B. 0.03
    C. 0.04
    D. 0.10

A cluster sample provided the following:

$M_1 = 20,\ a_1 = 12, x_1 = 90; M_2 = 30,\ a_2 = 15, x_2 = 90; M_3 = 30,\ a_3 = 13, x_3 = 60$

33. Calculate the point estimate of the population mean
    A. 0.50
    B. 3.00
    C. 0.33
    D. 2.00

A cluster sample provided the following:

$M_1 = 20,\ a_1 = 12, x_1 = 90; M_2 = 30,\ a_2 = 15, x_2 = 90; M_3 = 30,\ a_3 = 13, x_3 = 60$

34. Calculate the point estimate of the population proportion
    A. 0.50
    B. 3.00
    C. 0.33
    D. 2.00

Use the following information to answer Questions 35 to 44. A statistician wishes to know the effect of class format on student learning, as measured by improvement on examination scores from the beginning to the end of the semester. The five class formats to be studied reflect different emphases on homework problems and computer exercises. Sixty students are randomly selected for this study, 12 students are randomly assigned to each class format.

35. In this example the term factor is illustrated by
    A. The change in exam scores
    B. The class formats
    C. The different emphases on homework problems and computer exercises
    D. The 12 students in the sample from each class format
    E. The 60 students in the random sample

36. The term treatment is illustrated by
    A. The change in exam scores
    B. The class formats
    C. The different emphases on homework problems and computer exercises
    D. The 12 students in the sample from each class format
    E. The 60 students in the random sample

37. The term replication is illustrated by
    A. The change in exam scores
    B. The class formats
    C. The different emphases on homework problems and computer exercises
    D. The 12 students in the sample from each class format
    E. The 60 students in the random sample

38. The term response is illustrated by
    A. The change in exam scores
    B. The class formats
    C. The different emphases on homework problems and computer exercises
    D. The 12 students in the sample from each class format
    E. The 60 students in the random sample

39. This example best reflects which experimental design
    A. Randomised block design
    B. Completely randomised design
    C. Factorial design
    D. Individual treatment means

40. Which of the following require conditions for using the analysis of variance?
    A. The data are obtained from independently selected samples
    B. The populations are all normally distributed
    C. The populations have the same variance
    D. All of the above are necessary condition
    E. None of the above A, B, and C are necessary condition

41. A completely randomised experimental design resulted in data from three sample groups each comprising four observations. the degrees of freedom for the critical value of F are
    A. 11
    B. 2,9
    C. 2,11
    D. 3,11

42. A factorial experiment that involved four levels of factor A, five levels of factor B and three replications would have error degrees of freedom equal to
    A. 60
    B. 24
    C. 40
    D. 59

43. To compute the F statistics needed to test the significance of factor A, factor B and interaction in a two -factorial experiment, we need to compute
    A. MSA and MSB
    B. MSA, MSB and MSAB
    C. MSA, MSB, and MSE
    D. MSA, MSB, MSAB and MSE

44. The sampling distribution for a goodness of fit test is the
    A. Chi square distribution
    B. t distribution
    C. F distribution
    D. Normal distribution

Use the following information for question 45 to 50. the AMMUSTED bush canteen has four major food varieties', gari and beans, Ga Kenkey, rice and stew and ampesie and stew.300 students are randomly selected to check whether there is any significant difference in food preference. the results are as follows.

Food preferred	Number of students
Gari and beans	65
Ga kenkey	89
Rice and stew	72
Ampesie	74

45. The critical value for the multinomial goodness of fit test with a 0.01 level of significance is
    A. 0.25139
    B. 7.77944
    C. 11.3449
    D. 13.2767

46. The expected frequency is
    A. 4 for each food variety
    B. 50 for each food variety
    C. 75 for each food variety
    D. Different for each food

47. The calculated value of the test statistics for this chi-square goodness of fit test is
    A. 4.08
    B. 8.52
    C. 11.3
    D. 306

48. The result of the test at the 0.1 level of significance is which of the following
    A. There is a significance difference in food preference
    B. There is no significance difference in food preference
    C. The information provided is not sufficient to make any conclusion
    D. The level of significance selected is not was not appropriate to aid result in A and B

49. The value of the chi square statistics cut off an area in the upper tail of 0.01 with 8 degrees of freedom is closest to
    A. 14
    B. 19
    C. 22
    D. 25

50. The value of the chi square statistics cut off an area in the upper tail of 0.025 with 8 degrees of freedom is closest to
    A. 20
    B. 50
    C. 75
    D. 100

SECTION B

ANSWER THE QUESTIONS IN THIS SECTION IN THE SPACE PROVIDED

Ghana brewery manufactures and distributes three types of beers: alow-calorie light beer, a regular beer, and a dark beer. In the analysis of the market segments for the three beers, the firm's market research by the marking department has raised the question of whether preferences for the three beers differ between male and female beer drinkers.

Suppose that a simple random sample of 150 drinkers has been selected. After taste-testing the three beer, the individuals in the sample are asked to state their preference or first choice and summarized the responses in the contingency table below.

		BEER PREFERENCE			
		LIGHT	REGULAR	DARK	TOTAL
SEX	MALE	20	40	20	80
	FEMALE	30	30	10	70
	TOTAL	50	70	30	150

Use the data in the table above to test whether beer preference is gender dependent at 5% level of significance