



**AMREF INTERNATIONAL UNIVERSITY
SCHOOL OF MEDICAL SCIENCES
DEPARTMENT OF NURSING & MIDWIFERY SCIENCES
END OF SEMESTER DECEMBER 2023 EXAMINATIONS**

COURSE CODE AND TITLE : BSN 315 BIOSTATISTICS

DATE : 6-DECEMBER 2023

Duration : 2 HOURS

Start : 9 :00 A.M

Finish : 11 :00 A.M

INSTRUCTIONS

- 1.** This exam is out of 70 marks
- 2.** This Examination comprises THREE Sections. Section I: Multiple Choice Questions (20 marks) Section II: Short Answer Questions (30 marks) and Section III: Long Answer Questions (20 marks)
- 3.** Answer ALL Questions.
- 4.** Do Not write anything on the question paper -use the back of your booklet for rough work if need be.

SECTION I: MULTIPLE CHOICE QUESTIONS**(20 MARKS)**

1. As the sample size increases, standard deviation: -
 - A. Decreases
 - B. Increases
 - C. Remains the same
 - D. May increase or decrease
2. In a 3 by 3 table, the number of degrees of freedom is: -
 - A. 4
 - B. 9
 - C. 3
 - D. 81
3. Most of the values in data spread along the: -
 - A. Mean
 - B. Mode
 - C. Median
 - D. Range
4. Prevalence of disease is referred to as: -
 - A. Rate
 - B. Deviation
 - C. Proportion
 - D. Ratio
5. The type II error is the acceptance of a null hypothesis as true when it is: -
 - A. Negative valued
 - B. True
 - C. Nonexistent
 - D. False
6. Standard error of a mean indicates: -
 - A. Dispersion
 - B. Distribution
 - C. Deviation
 - D. Variation
7. The correlation between variable A and B in a study was found to be 1.1. This indicates: -
 - A. Weak correlation
 - B. Strong correlation
 - C. Moderate correlation
 - D. Calculation error

8. An investigator wants to know the similarity of the mean peak flow of expiratory rates and non-smokers, light smokers, moderate smokers, and heavy smokers. The statistical test of significance is: -
- A. Two way ANOVA
 - B. One way ANOVA
 - C. Chi square test
 - D. Student t test
9. In assessing the association, two investigators A and B found significant results with p values 0.02 and 0.04 respectively. The magnitudes of association found by two investigators infer: -
- A. Nothing can be concluded as the information given is inadequate.
 - B. The magnitude of association found by B is more than A
 - C. The magnitude of association found by A is more than B
 - D. The estimates of association obtained by A and B will be equal, since both are significant
10. More false positive on screening in a community signify that the: -
- A. Test has low specificity
 - B. Disease has high prevalence
 - C. Disease has low prevalence
 - D. Test has high sensitivity
11. When frequency is given as mild, moderate, and severe, the data scale used is: -
- A. Variance
 - B. Interval
 - C. Nominal
 - D. Ordinal
12. If the mean cholesterol value of a group of normal subjects is 230 mg% with standard error of 10. The 95% confidence limits for the population is: -
- A. 220 and 240
 - B. 20 and 240
 - C. 200 and 260
 - D. 210 and 250
13. The weight of 100 children was 12 Kgs, the standard deviation was 3, calculate the percent coefficient of variance: -
- A. 55%
 - B. 25%
 - C. 45%
 - D. 35%

14. Study that is used to compare serum cholesterol levels in obese and non-obese women and to find the relation or significant prevalence is: -
- A. Paired test
 - B. Student t test
 - C. Z-test
 - D. Chi-square test
15. Correlation between height and weight of children is best represented by: -
- A. Bar diagram
 - B. Histogram
 - C. Line diagram
 - D. Scatter diagram
16. Yates correction is necessary in Chi-square test when expected frequency in any one cell is: -
- A. Less than 10
 - B. More than 10
 - C. Less than 5
 - D. More than 5
17. The following is true about probability of complementary events: -
- A. The probability of an event is equal to 1 minus the probability of its complement
 - B. It follows the third property of probability
 - C. The event and its complement are mutually exclusive.
 - D. The probability of one event is dependent on the other
18. A statistic that describes the interval of scores bounded by the 25th and 75th percentile ranks is: -
- A. Inter quartile range
 - B. Confidence Interval
 - C. Standard deviation
 - D. Variance
19. Match the following words : - (2 marks)
- | | |
|--------------------------------|---|
| i. Sensitivity | A. The probability that a person does not have the disease given that the test was negative |
| ii. Specificity | B. The probability that a person has the disease given that the test was positive |
| iii. Positive predictive value | C. The probability that the test is positive given that the person has the disease. |
| iv. Negative predictive value | D. The probability that the test was negative given that the person does not have the disease |

SECTION II: SHORT ANSWER QUESTIONS**(30 marks)**

1. State five steps used in constructing box and whisker plot (5 Marks)
2. From past experience with illnesses of his patients, a doctor has gathered the following information in a population:
 - 12% feel that they have cancer and do have cancer
 - 38% feel that they have cancer and don't have cancer
 - 23% do not feel that they have cancer and do have it
 - 27% feel that they do not have cancer and really do not have it
 - a) Calculate the probability that a patient has cancer, given that he feels he has it (2 Marks).
 - b) Calculate the probability he feels he has cancer, given that he does have it is given (2 Marks)
3. State three (3) characteristics of normal distribution (3 Marks)
4. In a nutrition survey among 246 town school children 36 were found to be malnourished and among 349 villages 61 were found to be malnourished.
 - a) State the null hypothesis (1 Mark)
 - b) Calculate standard error between the proportions (2 Marks)
 - c) Calculate critical ratio (2 Marks)
 - d) Interpret the results (1 Mark)
5. State four assumptions used in the student t test (4 marks)
6. State two considerations for Chi square test analysis (2 Marks)
7. The following were observation made on the age of 50 women receiving antenatal clinic service in Kibra sub-county health facility.
45, 13, 17, 18, 15, 28, 33, 36, 44, 14, 17, 18, 19, 20, 27, 39, 36, 47, 48, 27, 18, 15, 15, 16, 13, 20, 19, 16, 12, 14, 48, 28, 28, 29, 36, 38, 32, 43, 55, 37, 25, 26, 23, 24, 18, 13, 15, 18, 34, 27.
Using frequency distribution table for the data set (use class-interval of 5)
 - a) Calculate the mean age of these women (2 Marks)
 - b) Calculate the modal age of these women (2 Marks)
 - c) Calculate the median age of these women (2 Marks)

SECTION III: LONG ANSWER QUESTIONS**(20 Marks)**

1. In an experiment to investigate the time course of the effect of exercise on the rate of sweating in soldiers in the desert, the following results were obtained.

Soldier	1	2	3	4	5	6	7	8	9	10
Rate before (litres/hour)	3.6	3.9	4.2	4.0	3.8	3.5	4.2	4.0	3.9	3.8
During	4.5	4.4	4.8	4.3	4.6	4.5	5.0	4.6	4.1	4.6
1 hour after	3.9	4.4	3.7	3.9	3.5	4.2	4.0	4.1	3.6	4.6

- a) Explain two types of errors in hypothesis testing (4 Marks)
- b) Formulate null and alternative hypothesis (2 Marks)
- c) Calculate One-way ANOVA test statistic (12 Marks)
- d) Interpret the results from One-way ANOVA test (2 Marks)