



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

**BSN BSM 313: BIOSTATISTICS**

**DATE: 11<sup>TH</sup> APRIL**

**Duration: 2 HOURS**

**Start: 9:00**

**Finish: 11:00**

**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, the 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 a disease is:-
  - 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 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 between maternal nutritional status and birth weight of newborns two investigators A and B studied separately and found significant results with p-values 0.02 and 0.04 respectively. From this information what can you infer about the magnitudes of association found by the two investigators: -
- 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 positives on screening in a community signify that the: -
- A. Test has low specificity
  - B. Disease has a high prevalence
  - C. Disease has a low prevalence
  - D. Test has high sensitivity
11. When the 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 a 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 mean 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. The study used to compare serum cholesterol levels in obese and non-obese women and to find the significant prevalence is: -
- A. Paired test
  - B. Student t test
  - C. Z-test
  - D. Chi-square test
15. Correlation between the 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 for the Chi-square test when the 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 the probability of complementary events: -
- The probability of an event is equal to 1 minus the probability of its complement
  - It follows the third property of probability
  - The event and its complement are mutually exclusive.
  - The probability of one event is dependent on the other

18. The formula given below is a computational formula for: -

$$\sqrt{\frac{\sum(X - \bar{X})^2}{(n - 1)}}$$

- Variance
  - Mean
  - Standard deviation
  - t-statistic
19. A statistic that describes the interval of scores bound by the 25th and 75th percentile ranks is:-
- Inter quartile range
  - Confidence Interval
  - Standard deviation
  - Variance

20. The table below shows the decision made based on the hypothesis test, matching letters with errors that may occur due to decisions made based on the hypothesis.

		Decision	
		Reject	Fail to reject
Hypothesis	True	W	X
	False	Y	Z

- X – Type II error, Y – Type I error
- X – Type I error, Y – Type II error
- W – Type II error, Z – Type I error
- W – Type I error, Z – Type II error

## **SECTION B: SHORT ANSWER QUESTIONS**

**(30 MARKS)**

- Explain three (3) probability sampling methods used in research (6 marks).
- Distinguish between Skewness and Kurtosis of data distribution (4 marks)
- Outline five (5) steps in constructing box and whisker plots (5 marks)
- The following data were generated from patients on the distance they cover to access brain cancer treatment. Calculate the geometric mean of the distance they cover to access this service (4 marks)

20, 25, 86, 156, 309, 450, 13, 46, 38, 107, 132, 148, 8, 10, 12, 66, 88, 96, 150, 366

- 5) In a malaria survey among 346 Kisumu children, 54 were found with malaria and among 565 Nairobi children, 72 were found with malaria.
- Calculate the critical ratio (6 marks).
  - Interpret the results (2 marks)
6. Outline three assumptions that need to be met before performing ANOVA (3 marks)

**SECTION C: LONG ANSWER QUESTION – (20 MARKS)**

1. A random sample of 395 people was surveyed and each person was asked to report the highest education level they obtained. The data that resulted from the survey are summarized in the following table:

	High School	Bachelors	Masters	Ph.D.	Total
Female	60	54	46	41	201
Male	40	44	53	57	194
Total	100	98	99	98	395

- Outline five (5) steps you would use to test the hypothesis of these data using Chi-square (5 marks)
- Are gender and education level dependent at a 5% level of significance? Given that the critical value with 3 degrees of freedom is 7.815. (12 marks)
- State three (3) limitations of using Chi square test in these data (3 marks)

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