



**AMREF INTERNATIONAL UNIVERSITY**

**SCHOOL OF MEDICAL SCIENCES**

**DEPARTMENT OF NURSING & MIDWIFERY SCIENCES**

**End of Semester August 2025 Examinations**

**COURSE CODE: BSN 315/BSM 313: Biostatistics**

**DATE: Monday 4<sup>th</sup> August 2025**

Duration: 2 HOURS

Start: 900AM

Finish:

**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. The following best defines a population in statistics:
  - A. A small group selected for study
  - B. The entire group being studied
  - C. A variable being measured
  - D. A graphical representation of data
2. The process of selecting a portion from a population to estimate characteristics of the whole is called:
  - A. Sampling
  - B. Observation
  - C. Distribution
  - D. Hypothesis testing

3. The following is a qualitative variable:
  - A. Weight
  - B. Height
  - C. Blood group
  - D. Age
4. The best measure of central tendency for skewed data is:
  - A. Mean
  - B. Median
  - C. Mode
  - D. Range
5. Variance is defined as:
  - A. The square root of the mean
  - B. The average of squared deviations from the mean
  - C. The total value divided by frequency
  - D. The maximum value minus the minimum
6. A percentile is:
  - A. A measure of mean
  - B. A value below which a given percentage of observations fall
  - C. The middle value of a dataset
  - D. The difference between quartiles
7. The total probability of all possible outcomes in a sample space is:
  - A. 0
  - B. 1
  - C. 100
  - D. Depends on the number of events
8. In probability, mutually exclusive events:
  - A. Cannot happen at the same time
  - B. Must happen together
  - C. Have no effect on each other
  - D. Occur only in binomial distributions
9. Binomial distribution is best applied when:
  - A. Outcomes are continuous
  - B. There are more than two outcomes
  - C. There are only two possible outcomes
  - D. Data are skewed
10. In hypothesis testing, the null hypothesis ( $H_0$ ):
  - A. States there is a difference
  - B. Assumes a relationship exists
  - C. States no difference or effect exists
  - D. Is accepted if  $p < 0.05$

11. A Type I error occurs when:
  - A. The null hypothesis is falsely rejected
  - B. The null hypothesis is accepted when false
  - C. Data are normally distributed
  - D. The sample size is too small
12. The following best represents a p-value:
  - A. Probability that the null hypothesis is false
  - B. Probability of obtaining the observed result if the null hypothesis is true
  - C. Probability of a Type II error
  - D. Sample variance
13. The larger the sample size, the:
  - A. Smaller the standard error
  - B. Greater the mean
  - C. Higher the p-value
  - D. Lower the correlation
14. The Chi-square test is used to test:
  - A. Association between categorical variables
  - B. Differences in means
  - C. Differences in standard deviations
  - D. Correlation of variables
15. A positive Pearson r indicates:
  - A. No relationship
  - B. A strong inverse relationship
  - C. A direct relationship
  - D. Non-significant results
16. Non-parametric tests are used when:
  - A. Data is normally distributed
  - B. Sample size is large
  - C. Assumptions of parametric tests are violated
  - D. Data is on a ratio scale
17. In a positively skewed distribution, the relationship is:
  - A. Mean = Median = Mode
  - B. Mean < Median < Mode
  - C. Mode < Median < Mean
  - D. Mean = Mode > Median
18. A scatter plot is most useful for:
  - A. Displaying categorical data
  - B. Showing central tendency
  - C. Showing correlation between two variables
  - D. Showing frequency distribution

19. A correlation coefficient of -0.90 indicates:
- A weak negative correlation
  - A strong positive correlation
  - A strong negative correlation
  - No correlation
20. The term "inference" in statistics refers to:
- Guessing data values
  - Estimating unknown parameters
  - Describing population data
  - Data collection

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

- Explain three measures of dispersion and their significance in data interpretation. (6 marks)
- State five characteristics of a normal distribution curve. (5 marks)
- Differentiate between null and alternative hypotheses with examples. (6 marks)
- Outline three assumptions necessary for conducting an ANOVA test. (3 marks)
- Consider an experiment in which dissolution data have been collected on a particular formulation, yielding the following figures: 87, 109, 79, 80, 96, 95, 90, 92, 96, 98, 101, 91, 78, 112, 94, 98, 94, 107, 81, 96
  - Construct a stem and leaf display for this data. (3 marks)
  - Comment on the shape of the stem and leaf. (1 mark)
- In the health survey of schoolchildren, it is found that the mean Hb level of 64 boys is 9.2 per 100 ml with a standard deviation of 2.4. We can consider this group as taken from a population with a mean 11.0 g/100 ml?
  - State null hypothesis. (1 mark)
  - Calculate the Standard error of the mean. (3 marks)
  - Critical ratio. (2 marks)

**SECTION III: LONG ANSWER QUESTION** **(20 marks)**

7. A nursing researcher wants to determine whether there is a significant difference in the average blood pressure of patients receiving two different antihypertensive drugs.

Group A (Drug A): 132, 138, 140, 128, 134, 135, 137, 140, 131

Group B (Drug B): 122, 124, 130, 126, 128, 125, 129, 130, 133

- State six assumptions of the independent sample t-test. (6 marks)

- b) Calculate the mean and standard deviation for each group. (6 marks)
- c) Perform an independent samples t-test and state your conclusion, given the tabulated critical value of 12df at  $\alpha$  0.05 is 2.179. (8 marks)