



**University Examinations**  
**School of Medical Sciences**  
**Department of Nursing and Midwifery Sciences**  
**End of January -April 2025 Semester Examination**  
**Advanced Diploma in Applied Mental Health Practice**  
**COURSE CODE AND TITLE: ADMH106- BIostatistics**

**DATE: 8-APRIL-2025**

Duration: 2 HOURS

Start: 4:00 PM

Finish: 6:00 PM

**INSTRUCTIONS**

1. Write your University registration number on every booklet that you use
2. This exam is out of 60 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 (MCQs: 20 MARKS)**

1. A study wishes to assess the delivery type classified as cesarian, natural, and induced.  
\_\_\_\_\_ describes the appropriate measurement scale.
  - A. Continuous
  - B. Ordinal
  - C. Nominal
  - D. Dichotomous
2. \_\_\_\_\_ is the primary objective of biostatistics
  - A. To analyze data from clinical trials
  - B. To study biological processes
  - C. To apply statistical methods to biological data
  - D. To develop new medical treatments
3. An example of quantitative data is \_\_\_\_\_
  - A. Blood type
  - B. Gender
  - C. Age
  - D. Eye color
4. \_\_\_\_\_ is a statistical measure describes the spread or dispersion of data points around the mean
  - A. Median
  - B. Mode
  - C. Variance
  - D. Skewness
5. \_\_\_\_\_ is measure of dispersion is not affected by extreme values in a dataset
  - A Range
  - B. Variance
  - C. Interquartile range (IQR)
  - D. Standard deviation
6. For group data, the class interval having maximum frequency is known as:
  - A. Median class
  - B. Mode
  - C. Median
  - D. Model class
7. The pulse rate or weight of the patient are referred to as:
  - A. Nominal data
  - B. Continuous data
  - C. Discrete data
  - D. Random variable

8. Classification of objects or people into classes or groups in such a way that only one object or person falls in only one group at a time is called as
- A. Mutually exclusive
  - B. None Mutually exclusive
  - C. Dependent
  - D. Independent
9. If the calculated value of chi-square lies in the region of acceptance, then we;
- A. Accept  $H_0$
  - B. Reject  $H_0$
  - C. Reject 0.005  $H_0$
  - D. Accept 50%  $H_0$
10. The Chi-square test is always used to test:
- A. Population mean
  - B. Population median
  - C. Test of relationship
  - D. Test of impact
11. \_\_\_\_\_ is the main purpose of using the Least Squares Regression method
- A. To find the best-fitting line for a set of data points
  - B. To determine the mean of a data set
  - C. To compare two categorical variables
  - D. To calculate variance
12. The following statements is TRUE about residuals in regression;
- A. They measure the difference between actual and predicted values
  - B. They are always positive
  - C. They are used to calculate the standard deviation
  - D. They measure correlation strength
13. In simple linear regression, if the correlation coefficient ( $r$ ) is 0.9, this indicates:
- A. A weak negative correlation
  - B. A strong positive correlation
  - C. No correlation
  - D. A weak positive correlation
14. \_\_\_\_\_ is NOT a graphical method of data presentation.
- A. Bar chart
  - B. Histogram
  - C. Standard deviation
  - D. Pie chart
15. In an experiment, the variable that the researcher manipulates is called:

- A. Dependent variable
- B. Independent variable
- C. Control variable
- D. Extraneous variable

16. The statement of a research problem should:

- A. Be broad and ambiguous
- B. Clearly define what is being investigated
- C. Include only assumptions
- D. Avoid stating research objectives

17. A higher coefficient of variation indicates:

- A. Higher relative variability in the data
- B. Lower relative variability in the data
- C. No variability in the data
- D. No relationship between variability and mean

18. If the covariance between X and Y is zero, it implies:

- A. X and Y are independent
- B. X and Y have no linear relationship
- C. X and Y are negatively correlated
- D. X and Y are positively correlated

19. One major difference between Spearman's and Pearson's correlation is:

- A. Spearman's measures linear relationships, while Pearson's measures rank relationships
- B. Pearson's measures rank relationships, while Spearman's measures nonlinear relationships
- C. Pearson's measures linear relationships, while Spearman's measures monotonic relationships
- D. Spearman's is used for categorical data, while Pearson's is used for nominal data

20. In the regression equation  $Y = a + bX$ , what does b represent.

- A. Y-intercept
- B. Dependent variable
- C. Slope of the regression line
- D. Standard deviation

**SECTION II: SHORT ANSWER QUESTIONS (20 MARKS)**

**21.**

**a.** The following frequency distribution relates to Biostatistics students at Amref International University.

Weight in KGs	31-35	36-40	41-45	46-50	51-55	56-60	61-65
Number of students	9	6	15	3	1	2	2

i. Calculate the mean weight of the students (4Marks)

**b.** The following frequency distribution relates to psychology students at Amref International University.

Class Interval	Number of students
10-20	7
20-30	10
20-40	10
40-50	20
50-60	20
60-70	15
70-80	8

ii. Determine the median of the distribution (4 Marks)

22. A researcher wants to determine if there is a significant relationship between students' preferred study method and their exam performance. A random sample of 100 students was surveyed, and the results are summarized in the contingency table below:

**Study Method Passed Exam Failed Exam Total**

Group Study	30	10	40
Self-Study	25	15	40
Tutoring	15	5	20
<b>Total</b>	<b>70</b>	<b>30</b>	<b>100</b>

- i. Using a **0.05 significance level**, perform a chi-square test of independence to determine if the study method and exam performance are related. **(4 Marks)**

a. Five nursing and midwifery students have the following Biostatistics and Health Sciences rankings.

Student	Hasan	Otieno	Kamau	Kiprotich	Wanjala
Biostatistics	1	2	3	4	5
Health Science	5	3	1	4	2

- ii. Is there an association between the rankings in Biostatistics and Health Science? **(4 Marks)**
- iii. A teacher wants to examine the relationship between the number of hours students spend studying and their exam scores. The following data was collected from five students:

**Hours Studied (X) Exam Score (Y)**

2	50
3	55
5	65
7	75
9	85

Using the **least squares method**, determine the regression equation of the form:

$$Y=a+bX$$

(4 Marks)

### SECTION III: LONG ANSWER QUESTIONS (20 MARKS)

23. A study was conducted on three public and three private Universities in Kenya to analyze the relationship between education financing (in KES millions) and financial sustainability (on a scale of 1 to 100). The data collected is as follows:

University	Education Financing (In Millions of shillings)	Financing Stability
Amref International	4.8	72
Strathmore	6.1	70
USIU- Africa	5.2	75
TUK	5.5	60
KU	5.9	65
UON	6.8	68

- Calculate the **standard deviation** of education financing (X) and financial sustainability scores (Y). (8 Marks)
- Compute the **covariance** between education financing and financial sustainability. (8 Marks)
- Determine the **correlation coefficient (r)** and interpret the strength and interpret your answer (4 marks)