



**AMREF INTERNATIONAL UNIVERSITY**

**SCHOOL OF MEDICAL SCIENCES**

**DEPARTMENT OF NURSING & MIDWIFERY SCIENCES**

**END OF SEMESTER APRIL 2026 EXAMINATIONS**

**COURSE CODE AND TITLE: BSN 313 Biostatistics**

**DATE : 9TH APRIL 2026**

Duration: 2 HOURS

Start: 2PM

Finish:4PM

**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. In hypothesis testing, the hypothesis tentatively assumed to be true is:
  - a) Either the null or the alternative
  - b) The alternative hypothesis
  - c) Directional hypothesis
  - d) The null hypothesis
2. In a statistical test, the relationship between chi-square and alpha level (p-value) is:
  - a) Always inverse
  - b) Always direct
  - c) Always positive
  - d) Always negative

3. Which statistics test is applied to compare mean grade difference of your class exam results between first year and third year.
  - a) Paired t-test
  - b) Student's-t-test
  - c) Binary logistic test
  - d) Pearson Chi-Square test
4. You as a nurse researcher, wish to test the hypothesis that the incidence of hypertension among adults aged above 50 years is 25%, the null hypothesis that the incidence is:
  - a) Different from 25%
  - b) Equal to 25%
  - c) Less than 25%
  - d) More than 25%
5. Blood glucose is what type of variable?
  - a) Continuous variable
  - b) Discrete variable
  - c) Qualitative variable
  - d) Quantitative variable
6. The Student's independent t-test is:
  - a) A statistical test for comparing means of two groups
  - b) A statistical test for comparing modes between two groups
  - c) A statistical test for comparing variances between individuals
  - d) A statistical test for comparing means within the same group
7. If, after performing a Student test for comparison of means, we obtain  $p = 0.0256$ , then:
  - a) We reject the null hypothesis
  - b) We accept null hypothesis
  - c) We reject the alternative hypothesis
  - d) We cannot decide
8. The stages of a malignant cancer is recorded as 0, I, II, III, IV. The scale used is:
  - a) Alphanumeric
  - b) Numerical
  - c) Ordinal
  - d) Nominal
9. The fundamental statistical indicators are:
  - a) Mean and standard deviation
  - b) Mean and Median
  - c) Median and Variance
  - d) Variance and Mode
10. Which statistics test is employed to determine gender difference in blood pressure measurements?
  - a) Pearson Chi-Square test

- b) Student's-t-test
  - c) Paired t-test
  - d) Z-test
11. Which one of the following is nominal data
- a) Body weight
  - b) Education
  - c) Attitudes
  - d) Gender
12. In a normal distribution, what percentage of data falls within one standard deviation from the mean?
- a) 68%
  - b) 75%
  - c) 95%
  - d) 99%
13. Which research design is more appropriate to establish risk factors of a disease that has very low prevalence rate:
- a) Prospective studies
  - b) Cross-sectional
  - c) Case-control
  - d) Experimental
14. The best measure of central tendency for skewed data is:
- A. Mean
  - B. Median
  - C. Mode
  - D. Range
15. 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
16. 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  $p < 0.05$
17. The Chi-square test is applied to test:
- A. Association between categorical variables
  - B. Differences in means
  - C. Differences in standard deviations
  - D. Correlation of variables

18. A positive Pearson “r” indicates:
- A. No relationship
  - B. A strong inverse relationship
  - C. A direct relationship
  - D. Non-significant results
19. In a positively skewed distribution, the relationship is:
- A. Mean = Median = Mode
  - B. Mean < Median < Mode
  - C. Mode < Median < Mean
  - D. Mean = Mode > Median
20. A correlation coefficient of -0.90 indicates:
- A. A weak negative correlation
  - B. A strong positive correlation
  - C. A strong negative correlation
  - D. No correlation

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

1. State five characteristics of a normal distribution curve. **(5 marks)**
2. The following data set are systolic blood pressure measurements for eight (8) patients with hypertension **(9 Marks)**

Patients	Blood pressure measurement (mmHg)	Question
1.	146	Using the systolic blood pressure measurements for these 8 patients, find: a) The range of the data set <b>(1 Mark)</b> b) The median <b>(3 Marks)</b> c) The upper and lower quartiles <b>(2 Marks)</b> d) The interquartile range <b>(3 Marks)</b>
2.	196	
3.	136	
4.	138	
5.	140	
6.	129	
7.	132	
8.	188	

3. A prospective study recruited 10,000 smokers and 10,000 non-smokers aged 30 to 40 and followed them for 20 years. The cases of Lung cancer are shown in this table. What is the estimated relative risk of Lung cancer for smokers vs. non-smokers? **(6 marks)**

	No cancer	Cancer
Smokers	9800	200
Non-Smokers	9950	50

4. You are interested to conduct a research on factors associated with hypertension among University staff. If the current prevalence of hypertension in Kenya is 24% and the total number of staff in the University is 2000. Calculate the sample size for your study (**6 marks**).
5. Differentiate between null and alternative hypotheses with examples. (**4 marks**)

**SECTION III: LONG ANSWER QUESTION**

**(20 marks)**

1. You, as a nurse researcher, recruited 12 patients with type-2 diabetes for dietary modification intervention for a period of 6 months. The fasting blood glucose (FBG) levels in mmol/L before and after the dietary modification intervention is displayed in the below table.

No of patients	FBG measurements at baseline (before intervention)	FBG measurements at end-line (after intervention)
1.	8	6
2.	7	5
3.	9	6
4.	12	7
5.	11	6
6.	10	5
7.	9	6
8.	8	5
9.	13	7
10.	6	6
11	7	6
12	8	6

- a) Calculate the median fasting blood glucose levels before and after the intervention (**4 marks**)
- b) Calculate the paired t-test (**14 marks**)
- c) Is there any reason to suggest the dietary modification intervention was effective? Why (**2 marks**)

**t-Distribution table**

	P						
one-tail	0.1	0.05	0.025	0.01	0.005	0.001	0.0005
two-tails	0.2	0.1	0.05	0.02	0.01	0.002	0.001
DF							
1	3.078	6.314	12.706	31.821	63.656	318.289	636.578
2	1.886	2.92	4.303	6.965	9.925	22.328	31.6
3	1.638	2.353	3.182	4.541	5.841	10.214	12.924
4	1.533	2.132	2.776	3.747	4.604	7.173	8.61
5	1.476	2.015	2.571	3.365	4.032	5.894	6.869
6	1.44	1.943	2.447	3.143	3.707	5.208	5.959
7	1.415	1.895	2.365	2.998	3.499	4.785	5.408
8	1.397	1.86	2.306	2.896	3.355	4.501	5.041
9	1.383	1.833	2.262	2.821	3.25	4.297	4.781
10	1.372	1.812	2.228	2.764	3.169	4.144	4.587
11	1.363	1.796	2.201	2.718	3.106	4.025	4.437
12	1.356	1.782	2.179	2.681	3.055	3.93	4.318
13	1.35	1.771	2.16	2.65	3.012	3.852	4.221
14	1.345	1.761	2.145	2.624	2.977	3.787	4.14
15	1.341	1.753	2.131	2.602	2.947	3.733	4.073
16	1.337	1.746	2.12	2.583	2.921	3.686	4.015
17	1.333	1.74	2.11	2.567	2.898	3.646	3.965
18	1.33	1.734	2.101	2.552	2.878	3.61	3.922
19	1.328	1.729	2.093	2.539	2.861	3.579	3.883
20	1.325	1.725	2.086	2.528	2.845	3.552	3.85

