



# MERU UNIVERSITY OF SCIENCE AND TECHNOLOGY

P.O. Box 972-60200 – Meru-Kenya

Tel: +254(0) 799 529 958, +254(0) 799 529 959, + 254 (0) 712 524 293,

Website: [info@must.ac.ke](mailto:info@must.ac.ke) Email: [info@must.ac.ke](mailto:info@must.ac.ke)

---

## University Examinations 2022/2023

FIRST YEAR FIRST SEMESTER EXAMINATION FOR THE DEGREE OF MASTER IN NURSING

**NMM 7114: ADVANCED BIOSTATISTICS FOR ADVANCED NURSING PRACTICE**

DATE: AUGUST 2023

TIME: 3 HOURS

---

INSTRUCTIONS: Answer question *one* and any other *three* questions

---

### QUESTION ONE (30 MARKS)

- Highlight two random sampling techniques used in sample survey for a biostatistics research (4 marks)
- Highlight the importance of using mean as a measure of central tendency (3 marks)
- In a health study on heart attack a group of grown up was given aspirin and another group was given placebo. The results were as in a table

#### HEART ATTACK

YES NO

Group 1-placebo	189	10845
Group 2-aspirin	104	10933

- Calculate the risk estimates and interpret (3 marks)
- Calculate the odd ratio estimate and interpret (3 marks)



MUST is ISO 9001:2015 and



ISO/IEC 27001:2013 CERTIFIED Page 1

- d) Distinguish between discrete and continuous variables (2 marks)
- e) It is reported that 40% of people bite by dogs are infected with rabies. Suppose there were 12 victims
- Determine the probability that at least 3 were infected with rabies (4 marks)
  - Determine the mean and variance of this distribution (2 marks)
- f) Given the following data for weight of 50 women who visited the hospital

Weight (kg)	45-49	50-54	55-59	60-64	65-69	70-74	75-79
Frequency	3	7	18	10	6	4	2

- Calculate the arithmetic mean and mode (4 marks)
- Present the data using Histogram and the frequency curve (4 marks)
- Comment on the data distribution (1 mark)

### QUESTION TWO (20 MARKS)

- a) The following data relates to number of patients who recovered after undergoing any of the four treatment procedures. Test the hypothesis of equal treatment means for the four treatment procedures (11 marks)

	Treatment procedure			
	A	B	C	D
	26	32	28	26
	21	17	20	21.5
	28	20	24	23

- Briefly highlight three properties of a good estimator (6 marks)
- Briefly explain the use of statistical inference in biomedical research (3 marks)



**QUESTION THREE (20 MARKS)**

a) The data below relates to the weights in kg of 10 female and 8 male neonates recorded in a certain clinic

Female	3.5	4.1	2.6	1.9	2.3	2.2	3.3	2.0	2.6	1.8
Male	4.1	4.5	3.5	5.0	3.3	2.5	2.1	3.7		

- i. Test the claim at 5% level of significance that female neonat weights is less than that of males (10 marks)
  - ii. Determine the 95% confidence interval for mean weights of female neonates (2 marks)
- b) It is expected that 3% of tablets from a continuous production line will be defective. Find the probability that in a sample of 300 tablets chosen at random
- i. One will be defective (2 marks)
  - ii. None will be defective (2 marks)
  - iii. At least two will be defective (2 marks)
- c) State two properties of binomial distribution (2 marks)

**QUESTION FOUR (20 MARKS)**

a) A survey research was carried to investigate whether the living environment and incidence of typhoid are independent. The following data was obtained

	Living condition			
Typhoid infection	Clean	Fairy clean	Dirty	Total
Infection	10	27	63	100
No infection	55	19	12	86
Total	65	46	75	186

At  $\alpha = 0.05.$ , test the claim that the two attributes are independent (8 marks)



- b) Suppose that the diameters of hospital syringes manufactured by a certain firm machine are normal random variables with a mean of 10 millimeter and a standard deviation of 1 millimeters
- i. If for a given application the syringe must meet the requirement that its diameter fall between 9.9 and 10.2 millimeters, what proportions of the syringes made by this machine will meet requirement (4 marks)
  - ii. If 20% of syringes were rejected for their diameter being larger than the desired prescription, determine the largest acceptable diameter (4 marks)
  - iii. Determine the 95% confidence interval for the mean diameter of the syringes if 300 of them were produced by the machine (4 marks)

**QUESTION FIVE (20 MARKS)**

- a) The worms count in school going children ( $y_i$ ) was found to depend on among others the home sanitation cleanliness level ( $x_1$ ) and the household poverty index level ( $x_2$ ). A survey on 26 randomly picked children provided the following regression model and relevant information

$$y_i = 7.96 - 0.99x_1 + 0.63x_2$$

$$S.E(3.1), (0.41)(0.26)$$

$$r^2 = 0.82$$

- i. Highlight on the fitness of the model (2 marks)
  - ii. Test the significance of the regression coefficients ( $\beta_s$ ) and comment on your results (6 marks)
- b) Explain how you can test for normality in a data set (2 marks)
- c) Distinguish the following
- i. Positively and negatively skewed data (2 marks)
  - ii. One tailed and two tailed test (2 marks)
  - iii. Parametric and non-parametric test (2 marks)



- d) The following table shows the summary statistics for the counts of two types worms in patients

Worm Type	Daily wages	
	Mean count	Standard deviation
I	1220	161
II	1150	124

Compare the distribution of the two worms in patients

(4 marks)

