



THE CATHOLIC UNIVERSITY OF EASTERN AFRICA

A. M. E. C. E. A

REGINA PACIS INSTITUTE OF HEALTH SCIENCES

MAIN EXAMINATION

AUGUST – DECEMBER 2017 TRIMESTER

FACULTY OF SCIENCES

DEPARTMENT OF HEALTH PROFESSIONS' EDUCATION

ODEL PROGRAMME

HBMS 103: BIOSTATISTICS

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Date: DECEMBER 2017

Duration: 3 Hours

INSTRUCTIONS: Answer ALL Questions

SECTION A: (20 Marks)

Q1. Distinguish between these variables:

- a) Categorical and Numerical variables **(2 marks)**
- b) Nominal and ordinal variables. **(2 marks)**
- c) Discrete and continuous variables. **(2 marks)**
- d) Dependent and independent variables. **(2 marks)**

Q2. A health researcher collected data from 20 female patients in Avenue Special Clinic. The questionnaire captured the ages as shown below:

25, 31, 45, 28, 49, 19, 67, 32, 31, 20, 28, 35, 39, 46, 45, 65, 63, 47, 22, 28, 52, 54, 56, 58, 42.

- i) Construct a frequency distribution table, using a class interval of five. Apply the lower class boundary and upper class boundary, such that the observations are mutually exclusive. **(5 marks)**
- ii) Calculate the sample mean age for the female patients. **(3 marks)**
- iii) Calculate the variance. **(3 marks)**
- iv) Calculate the standard deviation. **(3 marks)**

Q3. State any five rules of probability. **(5 marks)**

Staff	Female	Male
Nurses	7	1
Physicians	3	2

- Q4. What is the probability of getting a nurse or male (2 marks)
- Q5. An Ipsos poll in Nairobi shows that 46% of Kenyans suffer from great stress. If three people were selected at random, what is the probability that all the three will say they suffer from great stress? (2 marks)
- Q6. What would setting a p value at 0.05 imply in a chi square test? (1 mark)

SECTION THREE: Question any TWO QUESTIONS. 20 mark each.

- Q1. A researcher wishes to try three different techniques to lower blood pressure of individuals diagnosed with blood pressure. The subjects are randomly assigned to three groups. The first group takes medication, the second group exercises, and the third group follows special diet. After four weeks the results are recorded as shown in the table below. (20 marks)

Medication	Exercise	Diet
10	6	5
12	8	9
9	3	12
15	0	8
13	2	4

Find if there is a statistical difference between the three techniques and accept or reject your hypothesis.

$$SS_{total} = \sum_{j=1}^p \sum_{i=1}^{n_j} (x_{ij} - \bar{x})^2$$

$$SS_{between} = \sum_{j=1}^p n_j (\bar{x}_j - \bar{x})^2$$

$$SS_{within} = \sum_{j=1}^p \sum_{i=1}^{n_j} (x_{ij} - \bar{x}_j)^2$$

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- Q2. Suppose the government of Burundi wants to introduce a new anti-malarial drug and that Doctors and Nurses are asked to give their opinion on whether to use the new drug or to keep using the old drug. The Null hypothesis (Ho) is that the opinion about the new drug does not depend on the professional status (doctor

or nurse). The observed values (O) are summarized in the following contingency table

Group	Prefer new drug	Prefer old drug	No preference	Sum
Nurses	100	80	20	200
Doctors	50	120	30	200
Sum	150	200	50	400

Use alpha= 0.05. Look up value from table B15

Ho- the opinion about the new drug does not depend on the professional status

H1- the opinion about the new drug depends on the professional status.

- i) Compute the chi square value X^2 **(14 marks)**
- ii) Determine the critical value **(3 marks)**
- iii) Make a decision whether to **Reject** or **Accept** the null hypothesis. **(1 mark)**
- iv) Make a conclusion. **(1 mark)**

Formula:

$$\chi^2_c = \sum \frac{(O_i - E_i)^2}{E_i}$$

Q3. A researcher wanted to establish the relationship between road accidents and beer consumption. The following results were recorded over time.

- i) Work out the correlation coefficient between road accidents and beer consumption. What conclusion did the researcher draw? **(10 marks)**
- ii) What is the significance of the correlation coefficient between road accidents and beer consumption? At 95% confidence interval. **(10 marks)**

Formula

$$r = \frac{\sum d_x d_y}{\sqrt{(\sum d_x^2 \sum d_y^2)}}$$

END