



THE CATHOLIC UNIVERSITY OF EASTERN AFRICA

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MAIN EXAMINATION

AUGUST - DECEMBER 2015 TRIMESTER

FACULTY OF SCIENCE

DEPARTMENT OF BIOLOGY

REGULAR PROGRAMME

BIO 300: PRINCIPLES OF BIOSTATISTICS AND DATA ANALYSIS

Date: DECEMBER 2015

Duration: 2 Hours

INSTRUCTIONS: Answer Question ONE and ANY other THREE Questions

- Q1. a) Describe the use of Yate's correction factor in calculating chi-square values. **(5 marks)**
- b) Differentiate between the following biostatistical terms
- i A parametric and a non parametric test
 - ii A dependent and independent variable.
 - iii One tailed and two tailed test
 - iv Descriptive and inferential statistics
 - v Type one and type two error. **(5 marks)**
- c) i State and define the measures of central tendency. **(3 marks)**
- ii Using the data below, calculate the measures of central tendency stated above.

3.3	3.5	3.6	3.6	3.7	3.8	3.8	3.8	3.9	3.9	3.9	
4.0	4.0	4.0	4.0	4.1	4.1	4.1	4.2	4.2	4.3	4.4	4.5

(8 marks)

- d) Consider the following data, which are a sample of amino acid concentrations (mg / 100 ml) in orthopod hemolymph.

240.6, 238.2, 236.4, 244.8, 240.7, 241.3, 237.9

i Determine the range of the data. **(1 mark)**

ii Calculate the variance, standard deviation and the coefficient of variation of the data. **(6 marks)**

Q2. a) If a population has $\mu = 47.0$ mm and $\sigma = 12.0$ mm what is the probability of drawing from it a random sample of nine measurements that has a mean length larger than 50.0 mm? **(4 marks)**

b) What is the probability of drawing a sample of twenty five measurements from the preceding population and finding that the mean of this sample is less than 40.0mm? **(5 marks)**

c) If 500 random samples of size twenty five are taken from the preceding population how many of them would have means larger than 50.0mm? **(6 marks)**

d) Give the characteristics of a normal distribution. **(5 marks)**

Q3. A clinical psychologist was interested in finding out if physical exercise alleviates depression. Three groups of equivalently depressed people were set as follows: no exercise; 20 minutes exercise and 60 minutes of exercise per day respectively. At the end of the month each participant was asked to rate how depressed they felt on a likert scale; from 1 through 100 resulting scores are recorded below

No exercise	20 minutes jogging	60 minutes jogging
23	22	59
26	27	66
51	39	38
49	29	49
58	46	56
37	48	60
29	49	56
44	65	62

Test if there was significant effect of exercise on depression levels at 0.05 level of significance. **(20 marks)**

- Q4. A public opinion poll surveyed a simple random sample of 1,000 farmers. Respondents were classified by gender (male and female) and by farming preference (cattle, tomatoes, maize) results are shown in the table below.

F. preference Gender	Cattle	Tomatoes	Maize
Male	200	150	50
Female	250	300	50

Do the men's farming preferences differ significantly from the women's preference? Use a 0.05 level of significance. **(20 marks)**

- Q5. A lab technologist hypothesized that electrical stimulation of the lateral habenula will result in a decrease in food intake in rats. Rats undergo stereotaxic surgery and an electrode is implanted in the right lateral habenula. After ten day recovery period (kept at 8% body weight) the rats are tested for the number of chocolate chips consumed during a 10 minutes period of the time both with an without electrical stimulation. The result are recorded below

With simulation	12	7	3	11	8	5	14	7	9	10
Without stimulation	8	7	4	14	6	7	12	5	5	8

Are the means of the two rat samples significantly different at 0.01 level of significance? **(20 marks)**

- Q6. A doctor is interested in the effect of biofeed back on the severity of migrane headache. He conducts an experiment in which 48 subjects in four differing cases of (12 subject in each) received varying training sessions. He also hypothesized that the number of training sessions will be different depending on whether the subject is clinically anxious or not clinically anxious. The score were recorded in the table below.

Number of training sessions

Anxiety level	4 sessions	8 sessions	12 sessions	16 sessions
Very clinically anxious	60	42	24	12
Moderate clinically anxious	54	36	18	48
Low clinically anxious	50	30	18	20
Not clinically anxious	56	29	16	48

What can the investigator conclude based on this investigation? Use 0.05 level of significance. **(20 marks)**

END