THE CATHOLIC UNIVERSITY OF EASTERN AFRICA

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MAIN EXAMINATION

SEPTEMBER – DECEMBER 2019 TRIMESTER

FACULTY OF SCIENCE

DEPARTMENT OF BIOLOGY

REGULAR PROGRAMME

BIO 300: PRINCIPLES OF BIOSTATISTICS AND DATA ANALYSIS

Date: DECEMBER 2019	**Duration: 2 Hours**
INSTRUCTIONS: Answer Question ONE and any other TWO Questions. You are provided with formulae and tables you may need in this examination	

Q1. a) Make a distinction between

i) Descriptive and inferential statistics **(2 marks)**

ii) Sample and census **(2 marks)**

iii) Permutations and combinations in probability statistics **(2 marks)**

iv) One tailed and two tailed tests of significance **(2 marks)**

v) Systematic sampling and stratified sampling **(4 marks)**

vi)

b) Ten members of a Biostatistics class had the following weights (in Kg)

55 67 74 70 60 68 75 68 88 74

Using the machine formula determine the standard deviation in the weights of this class **(7 marks)**

c) If a drug is likely to be more effective than a control in each trial, what is the probability of it being more effective than a trial in exactly five

out of six trials? **(3 marks)**

d) A County nutritional centre guidelines require that children who score in the bottom 15% on Body-Mass Index (BMI) be given protein fortified foods. If the BMI is assumed to be normally distributed with a mean μ = 136 and a standard deviation σ = 27, find the cut off BMI value below which a child should be considered for provision of protein fortified foods

(5 marks)

e) Patients arrive at a hospital accident and emergency department at random at a rate of 6 per hour. Find the probability that, during any 90 minute period, the number of patients arriving at the hospital accident and emergency department is exactly 7.

(3 marks)

Q2. In an investigation of pregnancy induced hypertension, one group of women with this disorder was treated with low-dose aspirin, and a second group was given a placebo. A sample consisting of 23 women who received aspirin has mean blood pressure 111 mm Hg and standard deviation 8 mm Hg; a sample of 24 women who were given the placebo has mean blood pressure 109 mm Hg and standard deviation 8 mm Hg.

a) State the test statistic appropriate for the above data and why

(3 marks)

b) At the 0.01 level of significance, test the null hypothesis that the two populations of women have the same mean blood pressure.

(17 marks)

Q3. a) Nine batches of beetles were weighed, kept at different relative humidities and weighed again after six days of starvation. Weight in milligrams was computed for each batch and the results were as shown below:

% Relative humidity	0	12	29.5	43	53	62.5	75.5	85	93
Weight	8.98	8.14	6.67	6.08	5.90	5.83	4.68	4.20	3.72

loss in mg									

Derive the linear regression formula for the data **(10 marks)**

b) Below is a frequency distribution for stem girth in centimeters of trees in a certain grassland

Class Interval	Frequency
88 – 95	3
80 – 87	3
72 – 79	5
64 – 71	4
56 – 63	7
48 – 55	4
40 – 47	7
32 – 39	3
24 – 31	8
16 – 23	2
8 – 15	4

i) Construct a relative frequency histogram for the above data **(7 marks)**

ii) Calculate the mean stem girth for trees in this grassland **(3 marks)**

Q4. A farmer is testing the effect of three different fertilizers, A, B, and C on the yields of tomato plants. He applies the fertilizers and then monitors the number of tomatoes grown on a random sample of four plants for each of the three types of fertilizer. The results in terms of number of tomatoes per plant are as follows:

A	B	C
24	21	16
18	26	22
27	32	19
28	25	17

a) State the test statistic appropriate for the above data and why **(2 marks)**

b) At the α = 0.05 level of significance Test if there is any difference in the mean number of tomatoes grown per plant based on the type of fertilizer.

(18 marks)

Q5. A survey in which independent random samples of people in three parts of the city were evaluated for whether or not they had malnutrition yielded the following results:

	Area A	Area B	Area C
Have malnutrition	87	73	66
Have no malnutrition	13	77	84

a) State the test statistic appropriate for the above data and why

(3 marks)

b) Can we conclude that area of residence and status of nutrition are related? Test at the 5% level of significance.

(17 marks)

END