



# **MAASAI MARA UNIVERSITY**

**REGULAR UNIVERSITY EXAMINATIONS**

**2023/2024 ACADEMIC YEAR**

**FIRST YEAR FIRST SEMESTER**

**SCHOOL OF PURE, APPLIED AND HEALTH  
SCIENCES**

**MASTERS OF SCIENCE IN PLANT PHYSIOLOGY**

**COURSE CODE: BOT 8106**

**COURSE TITLE: STATISTICS METHODS AND MODELLING**

**DATE:29/5/24**

**TIME:0230-0430HRS**

**INSTRUCTIONS TO CANDIDATES**

- a) SECTION A: ANSWER ALL THE QUESTIONS (25MARKS EACH)
- b) SECTION B ANSWER ANY TWO QUESTIONS (Each 25 marks)

**SECTION A: ANSWER ALL THE QUESTIONS (25MARKS EACH)**

1. The following are measurements of arterial blood gas analysis in goats

40	54	47	67	34	42	42	48	54	32
54	59	54	64	43	44	54	42	33	40
34	63	40	55	33	60	53	54	46	34
56	43	41	58	52	57	63	38	59	64

Using 5 as a class interval with the lowest starting at 30

a) Set up frequency distribution, cumulative frequency distribution, relative frequency and cumulative relative frequency distribution

**(10 marks)**

b) Construct a frequency histogram, frequency polygon and an ogive

**(10 marks)**

c) Calculate the mean, mode, median and quartiles

**(5 marks)**

**Question 2 (25 marks)**

A cross sectional study is done to determine the diagnostic accuracy to detect disease A in guinea fowl. The prevalence of the disease A is found to be 50%. In a sample of subjects' test X detects 85 subjects with the presence of the disease and 110 subjects with out of the total non-diseased

a) Construct a 2x2 contingency table showing all the positive and negative indices

b) Explain the following values at 95% interval **(3 marks each)**

- i) Sensitivity
- ii) Specificity
- iii) Positive probability
- iv) Negative probability
- v) Likelihood ratio

**SECTION B ANSWER ANY TWO QUESTIONS (Each 25 marks)**

**Question 3**

a) Discuss with examples the following principles in experimental design

**(10 marks)**

- i) Replication
- ii) Randomization
- iii) Control
- iv) Placebo-
- v) Blocking-

c) Discuss 3 methods of sampling giving an example of each

**(15 marks)**

#### Question 4

4a) It is known that the mean weight of avocados in Muranga county is 253g with a standard deviation of 20g. If X is the weight of avocados randomly selected find

- i)  $P(216 \leq X \leq 271)$
- ii)  $P(180 \leq X \leq 265)$
- iii)  $P(X \leq 268)$

4b) In a survey of nursing students pursuing a master's degree, 75 percent stated that they expect to be promoted to a higher position within one month after receiving the degree. If this percentage holds for the entire population, find, for a sample of 15, the probability that the number expecting a promotion within a month after receiving their degree is: **(10 marks)**

- a) Six
- b) No more than five
- c) At least seven
- d) Between six and nine, inclusive
- e) Find the mean and the variance with a sample size of 15

#### Question 5

The following are the mean weight of dry matter content in kale production after application of different BSF fertilizer. Determine the ANOVA of the below experiment **(10 marks)**

	BSF1	BSF2	BSF3
Replicate	A	B	C
1	34	23	47
2	46	29	43
3	21	36	42
4	27	31	38

The following data is collected before and after administration of a vaccine A to

children below 5 years. compute the appropriate t-test **(10 marks)**

Pre	22	63.5	96	9.2	50	64	34	3.1	69
post	65.5	91.5	59	37.8	19.6	84	40	10.1	87.8

C) Discuss the sources of variation in ANOVA **(5 marks)**

#### Question six

The table below shows the body weight and plasma volume of 10 healthy ducks

Subject	1	2	3	4	5	6	7	8	9	10
Weight	56	60	58	74	62	60	70.5	66	65	70
Plasma	2.7	2.8	2.5	3.6	3.4	2.6	2.9	3.0	3.1	3.4

volume

- a) Draw scatter diagram for the above data (**10 marks**)
- b) Estimate the regression coefficient and test the significance (**10 marks**)
- c) Determine if the high plasma volume correlates with high weight and test the coefficient of correction (**10 marks**)

**END//**