



(University of Choice)

**MASINDE MULIRO UNIVERSITY OF
SCIENCE AND TECHNOLOGY
(MMUST)**

MAIN EXAMINATION

**UNIVERSITY EXAMINATIONS
2023/2024 ACADEMIC YEAR**

FIRST YEAR FIRST SEMESTER EXAMINATIONS

**FOR THE DEGREE
OF
MASTER OF ARTS IN ECONOMICS**

COURSE CODE: ECO 802

COURSE TITLE: QUANTITATIVE METHODS

DATE: MONDAY, 18-12-2023

TIME: 9:00 -12:00

INSTRUCTIONS TO CANDIDATES

ATTEMPT QUESTION ONE AND ANY OTHER THREE

TIME: 3 Hours

MMUST observes ZERO tolerance to examination cheating

This Paper Consists of 3 Printed Pages. Please Turn Over.

QUESTION ONE (COMPULSORY)

a) What do you understand by the autoregressive moving average (ARMA) model. (3 marks)

b) Assume a model $Y = \beta_1 + \beta_2 X + \varepsilon$ where Y is dichotomous. After estimation of the model where; $Y = \begin{cases} 1 \\ 0 \end{cases}$, if 1 is Yes while if 0 is No. Explain what the following expressions represent based on Logit model and Probit model and compute the respective probabilities with respective interpretation. (9 marks)

(i) $\hat{\beta}_1 + \hat{\beta}_2 X$

(ii) $\hat{\beta}_1$

(iii) $\hat{\beta}_2$

c) Quadratic forms are commonly expressed by $Q(Y) = Y^T A Y$. Based on the concept derive the quadratic form and differentiate if $Y = \begin{bmatrix} Y_1 \\ Y_2 \\ Y_3 \end{bmatrix}$ and

$$A = \begin{bmatrix} 2 & 0 & 4 \\ 0 & 4 & 8 \\ 4 & 8 & 6 \end{bmatrix}$$

(3 marks)

QUESTION TWO

a) The following figures were obtained from a table for regression analysis with a dependent variable Y and independent variable X. $n = 5, \sum X = 11, \sum Y = 17, \sum X^2 = 30$ and $\sum XY = 43$. Estimate the parameters of the model using matrix algebra based on OLS when the model has an intercept. (7 marks)

b) A wholesaler sells a product at Ksh.100 a copy which is bought at Ksh.60. The quantity sold and respective probabilities are depicted in the table.

Quantity sold	100	110	120	130	140
Probability	0.15	0.1	0.25	0.3	0.25

What quantity should the wholesaler stock to maximize profit? (8 marks)

QUESTION THREE

- a) As a manager you are faced with the decision alternatives of either to have a small, medium or large facility. The table below represents the payoffs for the company at various states of nature.

Possible future demand	Alternatives		
	Small facility	Medium facility	Large facility
Low	10	7	-4
Moderate	10	12	2
HIGH	10	12	16

Advice using decision alternatives what the company can do under;

- The minimax regret criterion (4 marks)
- The expected loss criterion (assume probabilities of high = 0.2; moderate = 0.5; low = 0.3) (6 marks)

QUESTION FOUR

An agrovet selling feeds for animals. Two types of feeds, X and Y are sold from the market. The content of these feeds per unit in nutritional constituents are given in the Table below.

Nutrient	Nutrient Content in Feeds		Minimum Requirement of Feed Nutrient for a Pig
	X	Y	
1	24	12	216
2	6	18	182
3	30	20	300

If feed X is sold at Ksh.20 per unit and BY Ksh.40 per unit, how much of these two feeds should the agrovet sell to maximize profit? (15 marks)

QUESTION FIVE

- An estimation involving lagged explanatory variables may likely lead to the violation of the assumptions of OLS that can be remedied through Koyck's transformation. Examine the transformation steps for the model ($Y_t = a + b_1X_t + b_2X_{t-2} + \dots + \varepsilon_t$) using the concept. (8 marks)
- Examine the various steps that must be undertaken during the process of decision making. (7 marks)

