



(University of Choice)

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

MAIN EXAMINATION

**UNIVERSITY EXAMINATIONS
2022/2023 ACADEMIC YEAR**

FIRST YEAR SECOND SEMESTER EXAMINATIONS

**FOR THE DEGREE
OF
BACHELOR OF SCIENCE IN ECONOMICS & BACHELOR OF SCIENCE IN
ECONOMICS AND STATISTICS**

COURSE CODE: ECO 104

COURSE TITLE: MATHEMATICS FOR ECONOMISTS II

DATE: TUESDAY 18TH APRIL 2023

TIME: 8:00-10:00

INSTRUCTIONS TO CANDIDATES

ATTEMPT QUESTION ONE AND ANY OTHER THREE

TIME: 2 Hours

MMUST observes ZERO tolerance to examination cheating

This Paper Consists of 4 Printed Pages. Please Turn Over.

QUESTION THREE (20 marks)

a). Mr.Kiptoo is a price discriminating monopolist having the following functions for her milk production firm:

$$P_1 = 32 - 2Q_1$$

$$P_2 = 22 - Q_2$$

$$TC = 10 + 2Q + Q^2$$

Determine the prices and quantities for the milk in the two different markets

[9marks]

b) The following demand and supply functions were extracted from a perfectly competitive market

$$P = 80 - 1/2Q \quad \text{demand function}$$

$$P = 20 + 1/10Q \quad \text{supply function}$$

Determine Producer Surplus and Consumer Surplus at equilibrium

[6 marks]

c) Determine the consumers surplus for a market price of $P=4$ given; $P=5+Q$

$$\text{and } p=Q^2+Q+3$$

[5marks]

QUESTION FOUR (20 marks)

a). What do you understand by the term Comparative Statics

[2marks]

b). Solve the following system of linear simultaneous equations using Cramer's rule

$$8x_1 - x_2 = 16$$

$$2x_2 + 5x_3 = 5$$

$$2x_1 + 3x_3 = 7$$

[6 marks]

c) Given $u = \begin{pmatrix} 3 \\ 2 \\ 8 \end{pmatrix}$ and $v = \begin{pmatrix} 0 \\ -1 \\ 5 \end{pmatrix}$, evaluate uv and $d(u,v)$

[4 marks]

d). Discuss any four economic applications of derivatives

[8 marks]

QUESTION FIVE (20 marks)

a) What do you understand by the following

[6 marks]

i. A matrix

ii. Comparative statics

iii. Input –output analysis

b) Outline the assumptions of input – output model

[6marks]

c) List any three examples of static equilibrium

[3 marks]

d) What is the usefulness of the Lagrangian multiplier in mathematical optimization [5 marks]