



MAASAI MARA UNIVERSITY

**REGULAR UNIVERSITY EXAMINATIONS
2022/2023 ACADEMIC YEAR
FIRST YEAR FIRST SEMESTER**

**SCHOOL OF BUSINESS AND
ECONOMICS
BSC ECON, BSC AGECE, BSC AGBM,
BSC FIN ECON, BSC ECON STAT**

**COURSE CODE: ECO 1104 – 1
COURSE TITLE: MATHEMATICS FOR ECONOMISTS
I**

DATE: 8TH DECEMBER, 2022

TIME: 1430-1630

INSTRUCTIONS TO CANDIDATES

1. Answer Question **ONE** and any other **TWO** questions

QUESTION ONE (20 MARKS)

a) Define the following terms as used in Mathematics for Economists. Use examples where necessary. **(4 Marks)**

- i. Finite and Infinite Sets
- ii. Autonomous Consumption
- iii. Composite Function
- iv. Identity matrix and principal sub -Matrix

b) Given the universal set T and its subsets A and B:

$$T = \{1,2,3,5,7,9,10\}$$

$$A = \{1,3,7,9\}$$

$$B = \{1,2,5,9\}$$

Using a Venn Diagram, determine the intersection of the two sub -sets **(4 Marks)**

c. Discuss the limitations of Static Equilibrium Analysis **(3 Marks)**

d. A National Income Model is represented by the following functions:

$$Y = C + I + G$$

$$C = a + bY^d$$

$$T = d + tY$$

$$G = G_0$$

$$I = I_0$$

Derive Y^* , C^* and T^* at Equilibrium **(9 Marks)**

QUESTION TWO (15 MARKS)

a) Given the following Demand and Supply Function for commodity Y, find Equilibrium Price and Quantity **(4 Marks)**

$$Q_d = a - bP$$

$$Q_s = -c + dP$$

b) Explain the difference between sub-matrix, principal sub-matrix and identity matrix **(3 Marks)**

c) Find the determinant of the following matrix using cofactor expansion **(3 Marks)**

$$A = \begin{bmatrix} 4 & 9 & 10 \\ 5 & 2 & 0 \\ 6 & 1 & 6 \end{bmatrix}$$

d) Consider the following National Income Model

$$Y = C + I_0 + G_0$$

Find Equilibrium Y and C using substitution method **(3 Marks)**

e) Determine whether this function is homogeneous and if so, of what degree:

$$F(x, y) = \frac{x^{1.3}y^{2.6}}{xy^{1.2}} \quad \textbf{(2 Marks)}$$

QUESTION THREE (15 MARKS)

- a) Explain Three properties of determinants of a Matrix **(3 Marks)**
- b) Given the following equations:
- $$2x + y - z = 10$$
- $$x + 3y + 2z = 20$$
- $$-x + 2y + z = 10$$

Using Matrix Inversion Method, determine the values of x, y and z **(9 Marks)**

- c) Discuss the following types of equations and illustrate using a sketch **(3 Marks)**
- Linear Equations
 - Quadratic Equations
 - Cubic Equations

QUESTION FOUR (15 MARKS)

- a) The following Demand and Supply Functions represent General Market Equilibrium model for two commodities.

$$Q_{d1} = a_0 + a_1P_1 + a_2P_2$$

$$Q_{d2} = \alpha_0 + \alpha_1P_1 + \alpha_2P_2$$

$$Q_{s1} = b_0 + b_1P_1 + b_2P_2$$

$$Q_{s2} = \beta_0 + \beta_1P_1 + \beta_2P_2$$

Find Equilibrium Prices and Quantities for the two commodities **(12 Marks)**

- b) Discuss Three Laws of Matrix operations **(3 Marks)**

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