



# **MAASAI MARA UNIVERSITY**

**REGULAR UNIVERSITY EXAMINATIONS  
2020/2021 ACADEMIC YEAR  
FIRST YEAR FIRST SEMESTER**

**SCHOOL OF BUSINESS AND ECONOMICS  
BSc. Economics, BSc. Economics and  
Statistics & BSc. Financial Economics**

**COURSE CODE: ECO 1104**

**COURSE TITLE: MATHEMATICS FOR  
ECONOMISTS I**

**DATE: 28<sup>TH</sup> MAY, 2021**

**TIME: 1100 – 1300HRS**

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**INSTRUCTIONS TO CANDIDATES**

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

*This paper consists of **THREE** printed pages. Please turn over.*

### QUESTION ONE (20 MARKS)

a) Differentiate the following terms:

- i. Finite set and infinite set
- ii. Intersection of sets and union of sets
- iii. Identity matrix and null matrix **(3 Marks)**

b) One morning in a hotel, 54 customers ordered cocoa, 33 ordered milk, 19 ordered milk and tea, 22 ordered cocoa and milk, 16 ordered tea only, 9 ordered all three items and 14 ordered none of the above.

I. Show this information in a Venn diagram. **(3 marks)**

II. Find number of people who ordered;

- i. Cocoa and milk but not tea;
- ii. Cocoa and tea but not milk; **(2marks)**

b) Find the rational roots, if any of the following equation:

$$8x^3 + 6x^2 - 3x - 1 = 0 \quad \text{(3 marks)}$$

d) Derive the equation of the straight line that has a slope of 0.5 and passes through the point (2, 3) **(2 marks)**

d) Use the method of substitution to solve the simultaneous equations

$$\begin{aligned} 6x + 4y &= 16 \\ 5x + y &= 12 \end{aligned} \quad \text{(4 Marks)}$$

e) Solve the definite integral **(3 Marks)**

$$\int_3^{10} \frac{1}{4} x^8 dx$$

### QUESTION TWO (15 MARKS)

a) Given the following consumption function  $C = 70 + 0.85Y$

- i. Find the corresponding saving function. **(2 marks)**
- ii. What is the corresponding marginal propensity to save **(2 marks)**

b) Discuss the importance of mathematics in business and economics **(2 marks)**

c) Find the derivative of the following function  $Y = (3x+2y)^{16}$  **(5 Marks)**

d) Matrix multiplication is not commutative; given matrix A and B, proof that  $AB \neq BA$ .

$$A = \begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix} \text{ and } B = \begin{bmatrix} 0 & -1 \\ 6 & 7 \end{bmatrix} \quad \text{(4marks)}$$

### QUESTION THREE (15 MARKS)

- a) Highlight any four properties of matrix determinants (2 Marks)  
b) Find the determinant of matrix A using the Laplace method.

$$A = \begin{bmatrix} 15 & 7 & 9 \\ 2 & 5 & 6 \\ 9 & 0 & 12 \end{bmatrix} \quad (6 \text{ marks})$$

- c) The demand and supply functions of a two commodity market are given as follows:

$$Q_{d1} = 25 - 5P_1 + 6P_2$$

$$Q_{d2} = 15 + 8P_1 - 10P_2$$

$$Q_{s1} = -8 + 12P_1$$

$$Q_{s2} = 22 + 4P_2$$

Find the market clearing prices and quantities using fractions rather than decimals. (7 marks)

### QUESTION FOUR (15 MARKS)

- a) Find the derivative of the function (5 marks)

$$f(x) = \left( \frac{x^2 - x - 3}{x^2 + 1} \right) (x^2 + x + 1)$$

- b) Solve:  $\int (x^3 + 2x + 10) dx$  (5 marks)

- c) The demand and supply curves of commodity W in the market are defined by the following functions:

$$P = 160 - 8Q_d$$

$$P = 12Q_s$$

Where  $Q_d$  is the quantity demand.  $Q_s$  is the quantity supplied and  $P$  is the price. Determine the equilibrium price and quantity of W in the market. (5marks)

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