MAASAI MARA UNIVERSITY

REGULAR UNIVERSITY EXAMINATIONS 2021/2022 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: 30ᵀᴴ MARCH, 2022　　　　　**TIME: 0830-1030**

INSTRUCTIONS TO CANDIDATES

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

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

QUESTION ONE (20 MARKS)

a) Define the following terms:
   i.   Finite set and infinite set
   ii. Intersection of sets and union of sets
   iii. Equilibrium
   iv. Identity matrix and null matrix   **(4 Marks)**

b) Show that $X^{m/n} = \sqrt[n]{X^m} = (\sqrt[n]{X})^m$. specify the rules applied in each step.

                                                                           (3 marks)

b) Find the rational roots, if any of the following equation:
   $$2x^4 - 8x^3 + 6x^2 - x - 1 = 0$$ **(2 marks)**

d) State the three theorems of solving higher degree polynomial equations.
                                                                           (3 marks)

d) Explain the matrix inverses and their properties.   **(6 Marks)**

e) Solve the definite integral.   **(2 Marks)**

$$\int_{3}^{10} \frac{1}{5} x^{10} dx$$

QUESTION TWO (15 MARKS)

a) Given the following consumption function C = 700 + 0.65Y
        i.   Find the corresponding saving function.   **(2 marks)**
        ii. What is the corresponding marginal propensity to save **(2 mark)**
b) Find the derivative of the following function Y= $(x+4y)^{22}$ **(5 Marks)**
c) Given the following National Income model:
   $$Y = C + I_0 + G_0$$

   $$C = a + b(Y - T)(a > 0, \qquad 0 < b < 1) \; [T:taxes]$$

   $$T = d + tY \; (d > 0, \quad 0 < t < 1) \; [t:Income \; tax \; rate]$$

   Find Y^*, T^*, and C^* **(6 Marks)**

QUESTION THREE (15 MARKS)

a) Explain any four properties of matrix determinants   (**5 Marks**)

b) Discuss the power functio rule using ana apropriate example (**5 Marks**)

c) Find the determinant of matrix A using the Laplace method.

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

QUESTION FOUR (15 MARKS)

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

$Q_{d1} = 10 - 2P_1 + 6P_2$ Demand function for commodity 1

$Q_{d2} = 15 + 8P_1 - 10P_2$ Demand function for commodity 2

$Q_{s1} = -2 + 12P_1$ Supply function for commodity 1

$Q_{s2} = -22 + 4P_2$ Supply function for commodity 2

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

b)   Solve: $\int (x^3 + 2x + 10)\, dx$

(**5 marks**)

c) Discuss the importance of mathematics in business and economics

(**3 marks**)

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