**MAASAI MARA UNIVERSITY**

**SCHOOL OF BUSINESS AND ECONOMICS**

**END OF SEMESTER EXAM**

**ARE 103: MATHEMATICS FOR ECONOMISTS I**

**B.Sc. AGRICULTURAL ECONOMICS 1ST Year**

Instructions: Answer Question ONE and any other TWO Questions

* 1. Define the following terms as used in Mathematics for Economists
		1. Endogenous variables
		2. Autonomous Consumption
		3. Disjoint sets
		4. Functions
		5. Symmetric matrix **(5 Marks)**
	2. What is a non-singular matrix? Briefly discuss the conditions for non-singularity of a matrix **(5 Marks)**
	3. What are the limitations of Static (equilibrium) Analysis **(4 Marks)**
	4. Given

A = { 1,2,3,4,6,8} B = {2,5,6,8,12} C = {1,3,4,6,7,8,9}

Find A∩(BUC) **(3 Marks)**

* 1. Given:

 Y = C + I0 + G0

C = a + bY

Find Y\* and C\* using Cramer’s rule **(4 Marks)**

* 1. Given the following Consumption and Savings functions for the same economy,

C = 40 + 0.8Y

S = -20 + 0.4Y

1. Are these functions in conformity with economic theory? Why? **(2 Marks)**
2. Can Savings be negative in the real world as depicted by the autonomous component **(2 Marks)**
3. What are the advantages of Mathematics for Economists over literary economics **(5 Marks)**
4. Given the demand and supply functions of 3 commodities as follows:

 Qd1 = 60 – 3P1 + 2P2 + 2P3

 Qd2 = 12 + 2P1 – P2 + 2P3

 Qd3 = 20 – P1 + 2P2 – P3

 Qs1 = -10 + 2P1

 Qs2 = -8 + 2P2

 Qs3 = -15 + P3

Calculate the equilibrium prices and quantities of the three commodities **(10 Marks)**

1. Narok County’s economy has three sectors: Agriculture, Industry and Service. Each unit of gross output of Agricultural product (QA) requires inputs of 0.2 units of its own product, 0.4 units of Industrial product and 0.1 units of Service sector products. Each unit of gross output of Industrial product (QI) requires 0.1 units of its own product, 0.3 units of Agricultural products and 0.3 units of Service sector products. Each unit of gross output of Service product (Qs) requires 0.2 units of its own product, 0.2 units of Agricultural products and 0.2 units of Industrial product.
	1. What is the general use of the input- output analysis **(2 Marks)**
	2. What are the assumptions of the input-output model **(3 Marks)**
	3. Using Leontief Inverse Rule, find the required gross outputs QA, QI and Qs when the final demands for Agriculture, Industry and Service sector products are given as 100, 50 and 60 respectively **(10 Marks)**
	4. An Economy is represented by the following model:

S = -100 + 0.2Yd

I = 1200Y

T = 20 + 0.1Y

G = 500.

Find the equilibrium Income (Y) and Consumption (C) **(5 Marks)**

* 1. An economy is defined by the following model:

Y= C + I + G

C = c0 + c1Yd Where Y – National Income

I = i1Y C – Consumption

T = t0 + t1Y I – Investment

G = G0 G – Government expenditure

T – Tax

Find equilibrium Income (Y\*), Consumption (C\*) and Tax (T\*) **(10 Marks)**

* 1. What is equilibrium in economics **(2 Marks)**
	2. Name and explain the three types of equations in economic models **(6 Marks)**
	3. Find the homogeneity of the following functions
		1. f(x,y) = $\frac{3x^{2}y- x^{3}}{xy^{2}+x^{1.5 }y^{1.5}} $ **(3 Marks)**
		2. f(x,y) = $\frac{x^{2}y^{2}- x^{4}}{x^{3}y^{3}+xy^{5}}$ **(4 Marks)**