THE CATHOLIC UNIVERSITY OF EASTERN AFRICA

A. M. E. C. E. A

P.O. Box 62157

00200 Nairobi - KENYA

Telephone: 891601-6

MAIN EXAMINATION

JANUARY – APRIL 2019 TRIMESTER

FACULTY OF ARTS AND SOCIAL SCIENCES

DEPARTMENT OF ECONOMICS

REGULAR PROGRAMME

ECN 102: INTRODUCTION TO MATHEMATICS FOR ECONOMISTS

Date: APRIL 2019	**Duration: 2 Hours**
INSTRUCTIONS: Answer Question ONE and any other TWO Questions	

Q1. a) Describe the following sets using the rule method:

i. F = {0, 1, 8, 27, 64, 125, 216, …} **(2 Marks)**

ii. G = {…, -30, -20, -10, 0, 10, 20, 30, 40, …} **(2 Marks)**

iii. H = {1, 2, 3, 5, 7, 11, 13, 17, 19, 23, …} **(2 Marks)**

b) Let A = {1, 2, 3, 4, 5} and B = {0, 3, 6}. Find:

i) A n B **(2 Marks)**

ii) A U B **(2 Marks)**

iii) A – B **(2 Marks)**

iv) B – A **(2 Marks)**

c) Given a set S = {a, b, c},

Find:

i) P(S) **(2 Marks)**

ii The Cardinality of set S. **(2 Marks)**

d) Let A be the set of students who live one km from school and let B be the set of students who walk to classes. Use the rule method to describe the students in each of following sets:

i) A n B **(3 Marks)**

ii) A U B **(3 Marks)**

iii) A – B **(3 Marks)**

iv) B – A **(3 Marks)**

Q2. a) Classify all the following numbers as natural, whole, integer, rational, or irrational. List all that apply.

i) 117 **(2 Marks)**
ii) 0 **(2 Marks)**
iii) -12.64039… **(2 Marks)**
iv) -½ **(2 Marks)**
v) 6.36 **(2 Marks)**
vi) -3 (**2 Marks)**

b) Use a well-designed and labeled Venn diagram to show how the numbers listed in (a) above, are classified. Place each number where it belongs on the Venn diagram**.** **(8 Marks)**

Q3. a) The final grade a student of economics will get can be expressed in a linear function given here below:

G = 5 + 15X + 3Y;

Where; G is the final grade in economics
5, is the guaranteed percentage grade
X, is the number of hours studied per week, and
Y, is the number of questions attempted per week.

i) If the student studied for four hours, and attempted five (5) questions per week, what will be the student's final grade? **(8 Marks)**

ii) Assume that the General Motor's total cost (TC) and total revenue (TR) functions are given by the following quadratic functions:

TC = Q3 – 16Q2 + 96Q

TR = 236Q – 8Q2

What is the profit maximizing output? **(6 Marks)**
What is the maximum profit earned? **(6 Marks)**

Q4. a) Solve the following simultaneous equations using graphing method:

i) 4X + 3Y = 11
2X + Y = 5 **(4 Marks)**

ii) 4X + 3Y = -11
2X + Y = 5 **(4 Marks)**

b) If the demand (Qd), and supply (Qs) functions for sausages at the CUEA student center, are given below:

$$Qd = 50 - P$$
$$Qs = -10 + 2P$$

i) What is the market equilibrium price for sausages at the CUEA student Center? **(4 Marks)**

ii) What is the market equilibrium quantity of sausages at the student Center? **(3 Marks)**

iii) Using a well labeled diagram, Plot the market equilibrium for CUEA student Center. **(5 Marks)**

Q5. a) Using different rules of differentiation, find the first derivatives of the following functions:

i) $Y = (3X + 5)/(X^2 - 2)$ **(3 Marks)**

ii) $Y = (3X^2 + 4X)^{1/2}$ **(5 Marks)**

b) The monthly demand for T-shirts in Nairobi City is given by;

$$P = -0.05X + 25; \quad (0 < X < 400)$$

Where P denotes the wholesale unit price in Kenya shillings, and X denotes the quantity of T-shirts demanded. The monthly cost function for these T-shirts is given as:

$$C(x) = -0.001X^2 + 2X + 200$$

i) Find the revenue and profit functions **(4 Marks)**

ii) Find the marginal cost, marginal revenue, and marginal profit functions. **(4 Marks)**

iii) Find the marginal average cost function **(4 Marks)**

END