

CHUKA



UNIVERSITY

UNIVERSITY EXAMINATIONS.

FIRST YEAR EXAMINATION FOR THE AWARD OF DEGREE OF BACHELOR OF ECONOMICS AND STATISTICS, BACHELOR OF ARTS IN ECONOMICS AND SOCIOLOGY, BACHELOR OF ARTS GENERAL AND BACHELOR OF ARTS IN ECONOMICS AND MATHEMATICS

ECON 131: INTRODUCTION TO MATHEMATICS FOR ECONOMISTS

STREAMS: BSC (ECONSTAT) BA (ECON & SOCIOLOGY) BA (GENERAL) BA (ECON & MATH)

TIME: 2 HOURS

DAY/DATE: WEDNESDAY 5/12/2018

11.30 A.M - 1.00 P.M

INSTRUCTIONS:

- Answer Question ONE and any other TWO Questions.
- Do not write anything on the Question Paper

QUESTION ONE

(a) Solve the following simultaneous equations using crammers' rule method.

$3x_1 + 5x_2 = 8 \dots \dots \dots (i)$

$2x_1 + 3x_2 = 10 \dots \dots \dots (ii)$

[4 Marks]

(b) Two farmers P and farmer Q sold the following amounts of wheat and barley to the National Cereals and produce Board. (NCPB)

	Wheat	Barley
Farmer	Sales in Tonnes	
P	20	40
Q	30	50

The farmer made 500 dollars profit per tonne from wheat and 700 dollars per tonne from barley.

- (i) How much wheat did farmer Q sell to the cereal board (NCPB) [1 Mark]
- (ii) How much barley did farmer P sell to the cereal board (NCPB) [2 Marks]
- (iii) What is the total amount of barley sold to cereals board (NCPB) [2 Marks]

ECON 131

- (iv) Using matrix multiplication, find the profits made by each of the farmers from both wheat and barley. [5 Marks]
- (c) Find the derivative of z with respect to U given the following functions: $z = x^2y^3 - y^2$;
 $x = U - U^3$ [6 Marks]
- (d) Find the intersection of the following sets:
(i) $A = \{4, 1, 7, 0, 3, 6\}$
 $B = \{4, 3, 0\}$ [2 Marks]
- $A = \{2, 3, 1, 8\}$
 $B = \{4\}$ [2 Marks]
- (e) Compute the following logarithms functions.
(i) $\log_5(25)^{1/2}$ [2 Marks]
- (ii) $\ln\left(\frac{1}{\rho^{1/5}}\right)$
- (iii) $\log_5\left(\sqrt{5^{10}}\right)(5^{-2})$ [2 Marks]

QUESTION TWO

- (a) Given the following consumption functions
 $c = 70 + 0.85Y$
(i) Find the corresponding savings function. [3 Marks]
(ii) What is the corresponding marginal propensity to save? [2 Marks]
- (b) Given the following demand and supply functions
Where: $Q_d = 12 - p^2$
 $Q_s = -6 + p^2$
(i) Compute the equilibrium quantity demanded and supplied. [5 Marks]
(ii) Compute the equilibrium price. [2 Marks]
- (c) (i) Consider the following national income model for an economy with no external trade.
 $Y = C + I + G$ $G = 40$
 $C = 120 + 0.8Y$
 $I = 70$
(ii) Find equilibrium income and consumption. [8 Marks]

QUESTION THREE

(a) You are given the price and total cost of a firm

$$P = 4Q^2 + 3Q + 1$$

$$TC = 2Q^3 - 2Q^2 + Q + 10$$

Find the following: -

- (i) Total Revenue Function [2 Marks]
- (ii) Average Revenue Function [2 Marks]
- (iii) Marginal Revenue Function [2 Marks]
- (iv) Marginal Cost Function [2 Marks]
- (v) Average Cost Function [2 Marks]

(vi) Find the corresponding profit function and solve for the output which maximizes profit. [5 Marks]

(b) Given the following total cost function where:

$$Tc = \frac{1}{5}Q^3 - \frac{1}{2}Q^2 + 2Q + 18$$

Show that $ATC = AVC + AFC$ [5 Marks]

QUESTION FOUR

(a) Compute the derivative of the following:

(i) $y = \frac{3x^2+5}{x^3}$ [3 Marks]

(ii) $y = \frac{x^3-4x^4}{x^2-5}$ [3 Marks]

(iii) $y = \frac{5-4x^2}{\sqrt{x}}$ [4 Marks]

(iv) $y = 4\mu^2 + 3\mu; \mu = 6x^2 + 7$ [5 Marks]

(b) Given the marginal revenue function:

$MR = 4Q^2 + Q + 8$ The total revenue at zero units of output is 14. Determine the total revenue function. [5 Marks]

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