MASENO UNIVERSITY

UNIVERSITY EXAMINATIONS 2015/2016

FIRST YEAR FIRST SEMESTER EXAMINATION FOR THE DEGREE OF BACHELOR OF ARTS IN ECONOMICS WITH INFORMATION TECHNOLOGY

MAIN CAMPUS

AEC 103: MATHEMATICS FOR ECONOMISTS I

Date: 12th January, 2016 Time: 2.30 - 4.30pm

INSTRUCTIONS:

- **Answer question ONE and any other TWO questions.**

1 a). Umoja Investments approaches you for an advice on the choice between two investment projects A and B. Project A requires an initial outlay of KSh. 4,000 and will yield a return of KSh. 5,200 three years from now. Project B requires an initial outlay of KSh. 90,000 and is expected to yield a return of KSh. 110,000 in three

1 a). Umoja Investments approaches you for an advice on the choice between two investment projects A and B. Project A requires an initial outlay of KSh. 4,000 and will yield a return of KSh. 5,200 three years from now. Project B requires an initial outlay of KSh. 90,000 and is expected to yield a return of KSh. 110,000 in three years.

(Market rate of interest is 3% compounded continuously)

i. Define the terms internal rate of return (IRR) and net present value (NPV) (3marks)

ii. Apply NPV approach to advice Umoja Investments (5marks)

iii. Apply IRR approach to advice the Umoja Investments (5 marks)

iv. Compare the IRR and NPV approaches (2 marks)

1b). The national income (**Y**) of country X is growing at an annual rate of 1.3%, while the population (**P**) is growing at the rate of 2.5% per annum.

i. Find the growth rate of per capita income(**PCY**) for country X (8 marks)

ii. Given a general function

$$y = \frac{u}{v}$$

Where u = u (t); v=v (t) and y = y (t)

Find the growth rate of y denoted (Gy) (7marks)

2 a). Given the following consumption function, find

$$C = 200 + 0.95Y^d$$
$$Y^d = Y - T$$
$$T = 20 + 0.2Y$$

i. The marginal propensity to consume (MPC) (4marks)

ii. The marginal propensity to save (MPS) (4 marks)

2 b). Given the following data

Farmer	Sales in Tons to Maseno University	
	Maize	Beans
Omondi	20	40
Rotich	30	50

The farmers made KSh. 500 profits per ton from maize and KSh. 700 per ton from beans

i. How much maize did Rotich sell to Maseno University? (2marks)

ii. How much beans did Omondi sell to Maseno University? (2marks)

iii. What is the total amount of beans sold to Maseno University by both farmers? (3marks)

iv. Find the profits made by each of the farmers from the sale both maize and beans. (5marks)

3 a). Given below is the National Income Model of a closed economy with Government and endogenous investment

$Y = C + I + G$
$C = a + By$
$I = i_0 + i_1 Y$
$G = G_0$

Required:

i. Identify the endogenous and exogenous variables in the model. (2marks)

ii. Identify parameters in the model. (2marks)

iii. Express the model in matrix format. (6marks)

3b). Expand the following summation. (5marks)

$\sum_{i=0}^{2} 6[x_i - y_i]$

3 c). Given the following total revenue and cost function,

$TR = 80\ln(Q + 1)$
$C = 3Q$

Find the level of profit corresponding to an output level of Q = 100^1. (5 marks)

4 a). Find the value of wine given that the initial value of wine is $\mathbf{W_o}$ = 100, the rate of growth is 3 %, the period of time is $\mathbf{t} = 9$, and the growing value of wine is given by the equation below. (5 marks)

$$W_r = Wo\, e^{rt^{\frac{1}{3}}}$$

4b). Compute the limit of x given the equation below. (5 marks)

$$\lim_{x \to 3} \left(\frac{x^2-9}{x-3}\right)^1$$

4c). Find the homogeneity of the following function (5 marks)

$$f(x,y) = Ax^c y^b$$

4d). Find the price elasticity of demand for the following hyperbolic demand function. (5 marks)

$$Q = aP^{-b}$$

5 a). i. Define an economic model using demand function. (2marks)

ii. State three importance of mathematical economics to an economist. (3marks)

5 b). Find the intersection of the following set (5 marks)

$$A = [x|0 \leq x \leq 15] \quad B = [4,5,6,7] \quad C = [x|8 \leq x \leq 100]$$

5 c). i. State the properties of irrational numbers (2 marks)

ii. Find the limiting value of g(x) (3 marks)

$$g(x) = \lim_{x \to \infty} \left(1 + \frac{1}{x}\right)^x$$

5d). Find the value of x (5 marks)

$$log_a a^{\frac{x}{4}} = 5^3$$