

MAASAI MARA UNIVERSITY

REGULAR UNIVERSITY EXAMINATIONS 2020/2021 ACADEMIC YEAR FIRST YEAR SECOND SEMESTER

SCHOOL OF BUSINESS AND ECONOMICS BSC. ECONOMICS, BSC. ECONOMICS AND STATISTICS & BSC. FINANCIAL ECONOMICS

COURSE CODE: ECO 1204-1 COURSE TITLE: MATHEMATICS FOR ECONOMISTS II

DATE: 4TH OCTOBER, 2021

TIME: 1430 -1630 HRS

INSTRUCTIONS TO CANDIDATES

Answer Question ONE and any other TWO questions

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

QUESTION ONE (20 MARKS)

a) Define the following terms:

- i. Conditions of matrix singularity
- ii. Inverse function rule
- iii. Dynamic Analysis
- iv. Polynomial vs rational functions

(2 Marks)

b) Given the production function Q below, find the MPP_K and the MPP_L, are MPP_k and MPP_L, functions of *K* and L alone or are they functions of both *K* and *L*?
(3 Marks)

$Q = 124K^{0.75}L^{0.25}$

c) If the utility function of an individual takes the form:

$$U = U(x_1, x_2) = (x_1 + 2)^2 (x_2 + 3)^3$$

Where U is total utility, and x_1 and x_2 are the quantities of two commodities consumed.

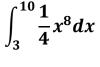
- i. Find the marginal utility function of x_1 and x_2 (3 marks)
- ii. Find the value of the marginal utility of the two commodities when 4 units of each commodity are consumed. (3 marks)

d) Explain the economic meaning of the Hawkins-Simon Condition. (1 marks)e) Find the inverse of matrix A.

$$A = \begin{bmatrix} 4 & 0 & 1 \\ 19 & 1 & 3 \\ 7 & 1 & 0 \end{bmatrix}$$
(5 marks)

f) Solve the definite integral

(3 Marks)



QUESTION TWO (15 MARKS)

a) KWAL Distilleries Ltd are in possession of a particular consignment of wine, which they can either sell at the present time (*t=o*) at a sum of KES *K*, or else store for some length of time and sell at a higher value. The growing value (*V*) of the wine takes the following function of time;

$$V = K e^{\sqrt{t}}$$

Assuming that the interest rate on the continous-compounding basis is r, where the present value of V can be expressed as; $(A(t) = Ve^{-rt})$.

| i. | Find the value of V at <i>t=0</i> | (1 mark) |
|------|---|--------------|
| ii. | What is the optimum storage time for KWAL Distillers? | (6 marks) |
| iii. | Assuming that $r=0.125$, then what is the number of year | rs that KWAL |
| | Distillers will store the wine to maximize on V? | (4 Marks) |

b) Find the derivative of the following function $Y = (x+2y)^{16}$ (4 Marks)

QUESTION THREE (15 MARKS)

- a) Consider a game where, for a fixed amount of money paid in advance, you can throw a die and collect KES 1500, if an odd number shows up, or KES 2500 if the number is even.
 - By use of diagrams explain the player's possible attitudes towards risk. (4 marks)
 - ii. Calculate the expected value of the payoff (2 Marks)
 - iii. Calculate the expected utility from playing (2 Marks)
- b) A firm has the followign total cost and demand functions;

$$C = \frac{1}{3}Q^3 - 7Q^2 + 115Q + 45$$

$$Q=120-P$$

Work out the profit maximizing level of output and the maximum profit.

(7 marks)

QUESTION FOUR (15 MARKS)

a) Given the input matrix and the final demand vector; find the solution output levels. (8 Marks)

| | [0.05 | 0.25 | 0.34] | | [1800] | |
|-----|--------|------|-------|------------|-----------------|--|
| A = | 0.33 | 0.10 | 0.12 | d = | 200 | |
| | LO. 19 | 0.38 | 0 | | 900 | |

b) The demand curves of a price discriminating monopolist are defined by the following functions in two markets:

$$Q_1 = 17.5 - \frac{1}{4}P_1$$

$$Q_2 = 85 - 3P_2$$

If the monopolist's Total Cost Function is given as:

- i. Determine the selling prices and quantities of Q in the two markets.
- ii. What is the firm'sprofit?

QUESTION FIVE (15 MARKS)

a) A farm faces the production function $Q = 18K^{0.4}L^{06}$. It can buy inputs K and L for KES 600 and KES 450 respectively. The firm's output is constrained at Q=4900. Find the Least Cost Combination of K and L.

(6 Marks)

(5marks) (2 Marks)

- b) Assume that the rate of investment is described by the function $I(t) = 12t^{1/3}$ and that K(0) = 25:
 - i. Find the time path of capital stock K. (3 marks)
 - ii. Find the amount of capital accumulation during the time intervals (0,1) and (1,3) respectively. (3 marks)
- c) Highlight any three premises of the Dormar model. (3 Marks)

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