1st SEM. 2018/2019

UNIVERSITY OF ESWATINI

FINAL EXAMINATION PAPER

PROGRAMME: BSc. in Agricultural Economics and Agribusiness Management Year II

COURSE CODE: AEM 203

TITLE OF PAPER: MATHEMATICS FOR ECONOMISTS

TIME ALLOWED: 2: 00 HOURS

INSTRUCTION: 1.ANSWER ALL QUESTIONS
2. EACH QUESTION CARRIES 25 MARKS

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Question 1. (25 marks)

1.1 Given the input-output matrix

$$A = \begin{bmatrix} 0.4 & 0.5 \\ 0.1 & 0.4 \end{bmatrix} \text{ and demand vector } D = \begin{bmatrix} 30 \\ 40 \end{bmatrix}$$

Find the production vector that will enable the economy to meet the demands?
(10 points)

1.2 A multiproduct firm is faced with the following cost function and a production constraint. The production constrains is stipulated in terms of production quota.

Cost function : $C = 2Q_1 + 4Q_2 - Q_1Q_2 + 10$

Production quota: $Q_1 + Q_2 = 16$

a) Set up a constrained cost minimization problem from the information given.

b) Construct the corresponding Lagrangian function.

c) Determine the critical values of Q_1 and Q_2.

d) Confirm that the critical values present a minimum   (15 points)

Question 2. (25 marks)

2.1 Given $Q = 700 - 2P + 0.02Y$, where Q is quantity demanded, p is price, and y is income, and given $p = 25$ and $y = 5000$

Find the a) price elasticity of demand.
         b) income elasticity of demand

(10 points)

2.2 Find MPL and MPK for the following production function
   a) $Q = 8K^{0.5}L^{0.25}$
   b) Determine whether or not the function is characterized with diminishing returns to factor inputs
   (15 points)

Question 3.   (25 marks)

3.1   Consider the following utility function $U = 15x^{1/3}y^{2/3}$

   Find the marginal utilities with respect to x and y when x = 100 and y = 200
                                                                    (10 points)

3.2 Calculate the definite integral.

$$\int_{1}^{2} x(x^2 + 6)\,dx$$ (5 points)

3.3 Find consumers' given the following demand function and equilibrium
     prices,   p= 50-0.5Q, $P_e = 30$ (10 points)

Question 4.   (25 marks)

4.1   An analysis of the financial statements of a coal mine, indicates that when
        x tons of coal are extracted a day, the income and cost (E)
        of the mine are respectively;
        $I (x) = 300x - 2x^2$
        $C(x) = x^2 - 2x + 500.$
     The mine is taxed at a rate of 30% on its gross profit.

     Determine a. the value of x which maximize the income.
                b. the gross profit and the value of x which maximizes it.
                c. the net profit and the value of x which maximizes it. (10 points)

4.2 Consider the following demand function for good a
   $Q_a = 200 - 4p_a - 2p_r + 0.2y$
   Where Q_a= Quantity of good a in demand.
        p_a = price of good a.
        P_r = price of some related goods r.
        Y = consumer income.
Given $p_a == 20$, $p_r = 24$, $y = 2000$,
Find the following elasticity and interpret your results.
 a) Own price elasticity of demand
 b) Cross-price elasticity of demand
 c) Income elasticity of demand
                                                              (15 points)

END OF PAPER