UNIVERSITY OF SWAZILAND

SUPPLEMENTARY EXAMINATION PAPER

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

COURSE CODE: AEM 203

TITLE OF PAPER: INTRO. TO MATHEMATICS FOR
ECONOMICS

TIME ALLOWED: 2: 00 HOURS

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

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THE CHIEF INVIGILATOR

Question 1.   (25 marks)

I. Determine the level of output which is necessary to meet final   demands of 100,and 200 respectively when the technological   coefficients are given by

$$\begin{pmatrix} 0.1 & 0.1 \\ 0.2 & 0.7 \end{pmatrix}$$

II. . Consider the function $f(x,y) = 3x^2 - 2x^3y + y^2$
   Find all the critical points of $f(x,y)$ and classify each of them as local maximum, local minimum or neither?

. **Question 2.   (25 marks)**

I. Given $Q = 30 - 3p + 0.02y$, where Q is quantity demanded, p is price, and y is income, and given $p = 60$ and $y = 1000$
Find the a) price elasticity of demand.
            b) income elasticity of demand

II The owner of a café has found that the relationship among the daily demand for ice-cream and the prices charged for ice – cream(i) and cool drinks (c) is expressed by means of the equation D $= 2000 - 2.5i + 0.39c$,
   where D is measured in liters, I in cents per liter and c in cents per can.

   Calculate the partial derivatives $\dfrac{\partial D}{\partial i}$ and $\dfrac{\partial D}{\partial c}$ .Explain the meaning of these

   derivatives.

Question 3.   (25 marks)

I.   Suppose that the demand and supply functions are numerically a follows;

$$Q_{d1} = 20 - 4p_1 + p_2$$
$$Q_{s1} = -3 + 6p_1$$
$$Q_{d2} = 11 + p_1 - 5p_2$$
$$Q_{s2} = -3 + 2p_2$$

What are the equilibrium solutions?

II. Calculate the definite integrals.

a) $$\int_{0}^{1} 3^x \, dx$$

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

Question 4.   (25 marks)

I.   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;

$$I(x) = 2312x - 2x^2$$
$$C(x) = x^2 - 2x + 2000.$$

The mine is taxed at a rate of 42% 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.

II.   Consider the following differential equation for $y(x)$

$$Y`` - 3y = 3e^x$$

a. Find the complementary function
b. Find the particular function.
c. Write down the solution to this equation, given the initial condition
    $y(0) = -2$ and $y`(0) = 2$

END OF PAPER