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 ANY FIVE QUESTIONS AND SHOW
YOUR STEPS.**
2. EACH QUATION CARRIES 20 MARKS.

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CHIEF INVIGILATOR**

1. Use Cramer's rule to find the value of x,y and that solve the following three equations simultaneously.

$$X - y + z = 2$$
$$2x - y + z = 3$$
$$x + 2y - 3z = -4$$

2. Find the point elasticity of supply ε_s from the supply function
   $Q = p^2 + 6p$, and determine whether the supply is elastic at $p = 2$.

3. The POT company is marketing two type of saucepans. Type I which is manufactured from stainless steel and Type II which is manufactured from aluminum alloy. From previous experience the company knows that type I will sell at $p_1 = 240 - 20x$ (E) a saucepan when the demand for I is x hundred, and that Type II will sell at $p_2 = 3000 - 30y$ E when the demand for II is y hundred. The production cost is known to be given by the function $C = 10x^2 + 2xy + 10y^2 + 500$.
   Determine the values of x and y for which the profit will be a maximum.

4. 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
   $D = 1210 - 1.9i + 0.49c$,
   where D is measured in liters, I in cents per liter and c in cents per can.
   Calculate the partial derivatives $\frac{\partial D}{\partial i}$ and $\frac{\partial D}{\partial c}$ .Explain the meaning of these derivatives.

5. 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;
   $I(x) = 1210x - 2x^2$
   $C(x) = x^2 - 2x + 1000$. The mine is taxed at a rate of 40% on its gross profit.
   Determine 1. The value of x which maximize the income.
   2. The gross profit and the value of x which maximizes income.
   3. The net profit and the value of x which maximizes income.

6. Consider the following problem;

Maximize $Z = 60x + 50y$

subject to;

$$2x + 4y \leq 80$$
$$3x + 2y \leq 60$$
$$x, y \geq 0$$

by means of the Graphical method

7. Calculate the definite integrals.

a) $\int_{1}^{2}(4x^2 + 2x - 3)dx$

b) $\int_{2}^{5} e^{2x}dx$

8. Given $Q = 50 - 2p + 0.01y$, where Q is quantity demanded, p is price, and y is income, and given $p = 10$ and $y = 3000$

Find a) the price elasticity of demand.

b) the income elasticity of demand.

9. Find the marginal and average functions for the following total functions ,

Total-cost function;

a) $c = 3q^2 + 7q + 12$

Total-revenue function;

b) $r = 10q - q^2$

Total – product function;

c) $q = aL + bL^2 - cL^3$ (a,b,c > 0)