



1st SEM. 2009

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UNIVERSITY OF SWAZILAND

FINAL 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)**1.1 Given the input-output matrix**

$$\begin{bmatrix} 0.2 & .05 \\ 0.4 & 0.5 \end{bmatrix} \text{ and demand vector } D = \begin{bmatrix} 50 \\ 60 \end{bmatrix}$$

Find the production vector that will enable the economy to meet the demands?**1.2 Solve the following linear system by using****a) Gaussian method****b) Cramer method**

$$x + 3y = 1$$

$$x - 4y = 2$$

1.3 The income and cost functions of a sugar producer are

$$I(x) = 64x - x^2$$

and $C(x) = x^2 + 4x + 50$ respectively where x is daily production in tons and $I(x)$ and $C(x)$ are measured in E.**a) For which value of x will the income be maximized?****b) Determine the gross profit and the value of x which will maximize the gross profit.****c) The producer is taxed at a rate of 44% on the value of x for which it is a maximum. Determine his net profit and the value of x for which it is a maximum.**

Question 2. (25 marks)**2.1 Calculate the definite integrals.**

a)
$$\int_0^1 3x + 5 dx$$

b)
$$\int_1^2 \ln x dx$$

2.2 The marginal cost function of a producer in terms of production (P) is given by:

$$C'(P) = 2P + P^3 + e^P$$

Where the total cost is in Rand(R).**If the fixed cost $C_F = \text{E}100$, find the total-cost function $C(P)$?****2.3 Suppose that $F(Q, K, L) = Q^3 K^2 + L^3 + QKL - 3 = 0$ is given then****find a) $\frac{\partial Q}{\partial L}$ and $\frac{\partial Q}{\partial K}$** **b) If $K = L = 1$ find the values in 2.3a.**

Question 3. (25 marks)

3.1 Given $Q = 100 - 2p + 0.03 Y$, where Q is quantity demanded, p is Price, and y is income, and given $p = 20$ and $y = 3000$

Find ;

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

3.2 Consider the following differential equation for $y(x)$

$$Y'' - 4y = 3e^x$$

- a. Find the complementary function
- b. Find the particular function.
- c. Write down the solution to this equation, given the initial condition $y(0) = -1$ and $y'(0) = 3$

Question 4. (25 marks)

4.1 Use the Lagrange –multiplier method to find the stationery value of Z and use the bordered Hessian to determine the stationary value of Z is a maximum or a minimum.

$$Z = x-5y -2xy, \text{ subject to } x +y = 3.$$

4.2 The demand and the supply for a certain product (in hundreds) in terms of its price (in cents) are given by the following equations:

$$D(P) = -p^2 + 12 \quad (\text{demand})$$

$$S(P) = 2p^2 + p + 8 \quad (\text{supply})$$

Find; a) the consumers surplus

b) the producers' surplus, when the market is in equilibrium.

END OF PAPER