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QUALIFICATION : **BACHELOR OF ECONOMICS**	
QUALIFICATION CODE: **07BECO**	LEVEL: **5**
COURSE: **MATHEMATICS FOR ECONOMICS 1B**	COURSE CODE: **MFE512S**
DATE: **JANUARY 2025**	SESSION: **2**
DURATION: **3 HOURS**	MARKS: **100**

SECOND OPPORTUNITY/SUPPLEMENTARY: EXAMINATION QUESTION PAPER

EXAMINER: ***Mrs. Yvonne Nkalle, Mrs. Lutopu Khoa & Mr. Tobias Kaenandunge***

MODERATOR: ***Mr. Ilenikemanya Ndadi***

INSTRUCTIONS:

1. Answer all questions on the separate answer sheet.
2. Please write neatly and legibly.
3. Do not use the left side margin of the exam paper. This must be allowed for the examiner.
4. No books, notes and other additional aids are allowed.
5. Mark all answers clearly with their respective question numbers.

PERMISSIBLE MATERIALS*:*

1. Non-Programmable Calculator

This paper consists of 3 pages including this front page

Question 1 [7 Marks]

Solve the following system of linear equations, using matrix inversion method.

$4x + 3y = 7$

$2x + y = 3.$

Question 2 [3; 4; 3 Marks]

A company has five retail stores. Stores 1, there are 18 TV's (t), 23 camcorders (c) and 14 printers (p). Stores 2, there are 15 TV's (t), 20 camcorders (c) and 19 printers (p). Stores 3, there are 18 TV's (t), 12 camcorders (c) and 24 printers (p). Stores 4, there are 10 TV's (t), 22 camcorders (c) and 11 printers (p). Stores 5, there are 13 TV's (t), 20 camcorders (c) and 18 printers (p). The price of one TV IS N$2300. One camcorder costs N$6024 and a printer costs N$ 1050.

(a) Express this inventory in the matrix form.
(b) What is the total value is the stock in store 2?
(c) What is the value of all the printers in the five stores?

Question 3 [10 Marks]

Given $A = \begin{bmatrix} -4 & 4 & 4 \\ -7 & 1 & 3 \\ 5 & -3 & -1 \end{bmatrix}$ & $B = \begin{bmatrix} 1 & -1 & 1 \\ 1 & -2 & -2 \\ 2 & 1 & 3 \end{bmatrix}$, Find BA.

Question 4 [11 Marks]

Solve the following system of linear equations, using Cramer's rule.

$2x_1 + x_2 = 5$

$3x_1 - 2x_2 + 4x_3 = 8$

$x_2 + x_3 = 3$

Question 5 [11 Marks]

Solve the following system of linear equations, by Gaussian elimination Method.

$9a + 3b + c = 64$

$36a + 6b + c = 133$

$81a + 9b + c = 208$

Question 6 [5 Marks]

Solve the following inequality $6(y-3) \leq 42$.

Question 7 [7 Marks]

A small firm builds two types of garden shed. Type A requires 2 hours of machine time and 5 hours of craftsman time. Type B requires 3 hours of machine time and 5 hours of craftsman time. Each day there are 30 hours of machine time available and 60 hours of craftsman. The profit on each type A shed is N$60 and on each Type, B is N$ 84. Formulate the linear programming model.

Question 8 [20 Marks]

Provide the solution to the following standard minimization problem, including all the steps.

Minimize C=20000 $x_1 + 25000x_2$

Subject to:

$400x_1 + 300x_2 \geq 25000$

$300x_1 + 400x_2 \geq 27000$

$200x_1 + 500x_2 \geq 30000$

$x_1;\ x_2 \geq 0.$

Question 9 [9 Marks]

Find the Jacobian determinants of the following functions and evaluate it at (0, -2). Conclude your answer.

$f(x,y) = e^{xy} + y$

$g(x,y) = y^2x$

Question 10 [10 Marks]

Calculate the Hessian determinant at the following point (1,1), given the following function and interpret your answers.

$f(x,y) = e^{ylnx}.$