KABARAK UNIVERSITY

EXAMINATIONS

2008/2009 ACADEMIC YEAR

FOR THE DEGREE OF BACHELOR OF EDUCATION SCIENCE

COURSE CODE: **MATH 211**

COURSE TITLE: **LINEAR ALGEBRA I**

STREAM: **SESSION III & IV**

DAY: **TUESDAY**

TIME: **2.00 – 4.00 P.M.**

DATE: **11/08/2009**

INSTRUCTIONS:

- Answer question **ONE** and any other **TWO** questions
- Begin each question on a separate page
- Show your workings clearly

PLEASE TURN OVER

QUESTION ONE (30 MARKS)

a) Define null space   (2 marks)

b) Determine the null space of the following matrices

i) $\begin{bmatrix} 2 & 0 \\ -4 & 10 \end{bmatrix}$ (4 marks)   ii) $\begin{bmatrix} 1 & -7 \\ -3 & 21 \end{bmatrix}$ (4 marks)

c) For the following matrices perform the indicated operation, if possible

$A = \begin{bmatrix} 2 & 0 & -3 & 2 \\ -1 & 8 & 10 & -5 \end{bmatrix}$ $B = \begin{bmatrix} 0 & -4 & -7 & 2 \\ 12 & 3 & 7 & 9 \end{bmatrix}$

i)   A + B   (3 marks)
ii) B - A   (3 marks)

d)   Given the following vectors compute and sketch the indicated quantity

$\mathbf{a} = (4,-6)$ $\mathbf{b} = (-3,-7)$ $\mathbf{c} = (-1, 5)$ $\mathbf{u} = (1,-2, 6)$ $\mathbf{v} = (0, 4,-1)$ $\mathbf{w} = (9, 2,-3)$

i) $- w$ (3 marks)
ii) $a + b$ (4 marks)
iii) $a - c$ (4 marks)

e) Given A = (1   2) and B = $\begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix}$ Find   BA   (3 marks)

QUESTION TWO (20 MARKS)

a) Determine the angle between the following vectors

i) $\mathbf{a} = (9,-2)$ and $\mathbf{b} = (4,18)$ (5marks)

ii) $u = (3,-1,6)$ $v = (4,2,0)$ (5 marks)

b) Solve the following system of equation using cramer's rule
$-2x_1+x_2-x_3=4$
$x_1+2x_2+3x_3=13$
$3x_1 +x_3 \quad =-1$ (10 marks)

QUESTION THREE (20 MARKS)

a) Solve the following using row-operations method

$$2x + y = 800$$
$$x + 3y = 1150$$

(10 marks)

b) Determine if each of the following sets of vectors are linearly independent or linearly dependent

     i) $v_1 = (3,1)$ and $v_2 = (-2,2)$ (5 marks)

     ii) $v_1 = (12,-8)$ and $v_2 = (-9,6)$ (5 marks)

QUESTION FOUR (20 MARKS)

Compute the inverse of the following matrix using the determinant method

$$A = \begin{bmatrix} 4 & 2 & 1 \\ -2 & -6 & 3 \\ -7 & 5 & 0 \end{bmatrix}$$

QUESTION FIVE (20 MARKS)

a) Determine if each of the sets of vectors will be a basis for R^3

     i) $v1 = (1,-1,1)$ $v2 = (0,1,2)$ and $v3 = (3,0,-1)$ (5 marks)

     ii) $v1 = (1,0,0)$ $v2 = (0,1,0)$ and $v3 = (0,0,1)$ (5 marks)

b) Given $u=(3,-1,4)$ and $v=(2,0,1)$ compute each of the following

     i)   uxv and vxu   (7 marks)

     ii)   uxu   (3 marks)