COLLEGE OF BUSINESS, PEACE, LEADERSHIP AND GOVERNANCE

NCSC 102: ALGEBRA

END OF SECOND SEMESTER EXAMINATIONS

APRIL 2022

LECTURER: TARAMBAWAMWE P

DURATION: 3 HOURS

INSTRUCTIONS

Answer Question 1(Compulsory) and any other question

Credit will be awarded for logical, systematic and neat presentations

Question One

a

$$\text{Let A} = \begin{pmatrix} 1 & 0 & -3 & 2 \\ 0 & 3 & 1 & -5 \\ 2 & 4 & 0 & 3 \\ -3 & 1 & -1 & 2 \end{pmatrix} \quad \text{if B} = \begin{pmatrix} 1 & 2 \\ 3 & -1 \\ 0 & -2 \\ 4 & 1 \end{pmatrix} \quad \text{and C} = \begin{pmatrix} 3 & -2 & 0 & 5 \\ 1 & 0 & -3 & 4 \end{pmatrix}$$

Find CAB   [5 marks]

b. Find
i..the determinant and
ii. the inverse of matrix A   [15 marks]

$$\text{if A} = \begin{pmatrix} 1 & 2 & 3 & 4 \\ -1 & 1 & 3 & -5 \\ 0 & 3 & 1 & -2 \\ 2 & 0 & 0 & -1 \end{pmatrix}$$

Question Two

a.   Find all values of a for which the system below has a nontrivial solution

[15 marks]

$1x -1y+ 2z=0$

$-1x +x+ 2z=0$

$3x -3y+ az=0$

b.   Solve the system of linear equations below using the Gauss-Jordan method
[15 marks]

$$\begin{cases} 2w - x + 5y + z = -3 \\ 3w + 2x + 2y - 6z = -32 \\ w + 3x + 3y - z = -47 \\ 5w - 2x - 3y + 3z = 49 \end{cases}$$

Question Three

a   Consider S = $[2, -3, 4, -1]^T$, $[-6, 9, -12, 3]^T$, $[3, 1, -2, 2]^T$, $[2, 8, -12, 3]^T$, $[7, 6, -10, 4]^T$

    i.   Is S linearly independent?   [8 marks]
    ii.   Construct a basis for span(S).   [7 marks]

b.   Show that in the space R^3 the vectors x = (1, 1, 0), y = (0, 1, 2), and z = (3, 1, −4) are linearly dependent   [8 marks]

c.   Let u = (0, 1, −8, 1) and v = (1, −8, 1, 7). Find w such that -2u + v − 3w = 0.
                                                                                [7 marks]

END OF EXAMINATION