Uganda Martyrs University Nkozi
Linear Algebra Test 1

Date: Thursday 10th Nov, 2022

Time: 9:00am - 10:00am

Instructions:

(i) Answer ALL the questions..

*(ii) Time allowed is **1 HOUR.***

1. Let

$$A = \begin{pmatrix} 1 & 1 \\ -2 & -1 \\ 1 & 2 \end{pmatrix}, \qquad B = \begin{pmatrix} 2 & 1 & -1 \\ 0 & 1 & -2 \end{pmatrix}, \qquad C = \begin{pmatrix} 1 & 1 & -1 \\ -1 & 2 & 0 \\ -1 & -1 & 1 \end{pmatrix}$$

Find if possible BA, B^tC, C^tB^t, $3A - 3^t - 2A^t$. If it is not possible explain why. [8 marks]

2. Let A and B be square matrices of order 3 such that $|A| = -2, |B| = 5$ where $|A|$ denote the determinant of A. Find

(i) $|3A^{-1}|$. [2 marks]

(ii) $|A|^4$. [2 marks]

(iii) $|(AB)^t|$. [2 marks]

(iv) $|-2A^2B^{-2}|$. [2 marks]

3. (a) What is meant by a square matrix A being invertible? [1 mark]

(b) Give one example of a tri-diagonal matrix of size 3. [1 mark]

(c) Let A be a square matrix of order n. Prove that $(A + A^t)$ is a symmetric matrix. [3 marks]

4. Consider matrix $A = \begin{pmatrix} 2 & 0 & 1 \\ 0 & -1 & 3 \\ 0 & 0 & 1 \end{pmatrix}$, Find the determinant of A using

(a) permutation-inversion technique. [3 marks]

(b) Cofactor expansion method. [3 marks]

5. Classify the various permutations of $S = \{2; 3; 4\}$ as an even or odd. [3 marks]