

**Jaypee Institute of Information and Technology**  
**Department of Mathematics**

**Course: Matrix Computations (16B1NMA533)**

**Tutorial Sheet 2 [C301-3.1]**

**(Topics covered: Rank of a Matrix, Echelon form, Block Matrix, Partitioning)**

1. Reduce the following matrices to row echelon form by introducing elementary row operations and find their rank:

$$(i) A = \begin{bmatrix} 1 & 2 & -3 & 0 \\ 2 & 4 & -2 & 2 \\ 3 & 6 & -4 & 3 \end{bmatrix} \quad (ii) B = \begin{bmatrix} 3 & 2 & -1 \\ 2 & -3 & -5 \\ -1 & -4 & -3 \end{bmatrix} \quad (iii) C = \begin{bmatrix} 1 & -2 & 0 & 4 \\ 3 & 1 & 1 & 0 \\ -1 & -5 & -1 & 8 \\ 3 & 8 & 2 & -12 \end{bmatrix}$$

2. Find the inverse of following matrices using partition method.

$$(i) A = \begin{bmatrix} -1 & 1 & 2 \\ 3 & -1 & 1 \\ -1 & 3 & 4 \end{bmatrix} \quad (ii) B = \begin{bmatrix} 1 & 1 & 0 & 1 \\ 1 & 1 & 1 & 1 \\ 4 & 4 & 1 & 1 \\ 1 & 0 & 0 & 1 \end{bmatrix}$$

3. Partition the given matrices **A** and **B**, and using results find **AB**.

$$A = \begin{bmatrix} -1 & 1 & 2 \\ 0 & 3 & 1 \\ -1 & 5 & 4 \end{bmatrix} \quad \text{and} \quad B = \begin{bmatrix} 6 & 1 & 2 \\ 0 & 2 & 0 \\ 1 & 2 & 4 \end{bmatrix}$$

4. Check if the following set of vectors (1,1,0,1), (1,1,1,1), (-1,1,1,1), (1,0,0,1) are linearly independent or not.
5. For the given matrix A,

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

Compute the following:

- (i) Trace of A   (ii)  $A^2$    (iii)  $\det(A)$