

Jaypee Institute of Information and Technology
Department of Mathematics

Course: Matrix Computations (16B1NMA533)

Tutorial Sheet 1 [C301-3.1]

(Topics covered: Basics of matrices, Elementary Operations, Elementary matrix, Inverse by elementary matrix)

1. Define elementary matrices.
2. Write the following matrices as a product of elementary matrices.

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

3. Consider a matrix $C = \begin{bmatrix} 1 & 0 & 1 \\ 2 & 1 & 2 \\ 1 & 0 & -1 \end{bmatrix}$. Reduce the matrix C to identity matrix using

elementary row operations. Also, write the elementary matrix corresponding to every operation used in reducing C to I.

4. Find elementary matrices which when multiplied on the right by any 3x 4 matrix A will
 - (a) Interchange the second and third rows of A,
 - (b) Multiply the third row of A by 5, and
 - (c) Add to the first row of A 6 times its second row.
 - (d) Subtract from the second row of A one third of first row.
5. Find the inverse of the following matrices using elementary matrices.

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