COURSE: LINEAR ALGEBRA
Course Code: MA2.101

Spring-2024

Instructor: Dr. Indranil Chakrabarty

Assignment 1: [Released date: 18.03.2024] [Submission Date: 28.03.2024]

Full Marks- 25

1. Find the inverse of the matrix by Gauss Jordan method: **[CO-1][3+3=6]**

a) $\begin{pmatrix} 0 & a & 0 \\ b & 0 & c \\ 0 & d & 0 \end{pmatrix}$ b) $\begin{pmatrix} a & 0 & 0 \\ 1 & a & 0 \\ 0 & 1 & a \end{pmatrix}$

2. Prove that if a symmetric matrix is invertible, then its inverse is symmetric also.**[CO-1][2]**

3. Let A= $\begin{pmatrix} 0 & 1 \\ -1 & 1 \end{pmatrix}$. Find A^2, A^3 ,...... A^7. Find A^{2015} **[CO-1] [5]**

4. There are no square matrices X and Y with the property that XY − YX = I . Give proof or a counterexample.**[CO-1][3]**

5. Show that following vectors **{u₁, u₂, u₃}** forms an orthogonal basis for $\mathbf{R}^3$ (where R is the set of all real numbers) and then find the coordinate of the vector **w** with respect to the basis $\{\mathbf{u}_1, \mathbf{u}_2, \mathbf{u}_3\}$

$\mathbf{u}_1 = \begin{bmatrix} 1 \\ 1 \\ 1 \end{bmatrix}$, $\mathbf{u}_2 = \begin{bmatrix} 1 \\ -1 \\ 0 \end{bmatrix}$, $\mathbf{u}_3 = \begin{bmatrix} 1 \\ 1 \\ -2 \end{bmatrix}$; $\mathbf{w} = \begin{bmatrix} 4 \\ 5 \\ 6 \end{bmatrix}$

[a= $\begin{bmatrix} a_1 \\ a_2 \\ a_3 \end{bmatrix}$ and b = $\begin{bmatrix} b_1 \\ b_2 \\ b_3 \end{bmatrix}$,the inner product $\langle a,b \rangle = a_1b_1 + a_2b_2 + a_3b_3$.] **[CO-2][5]**

6. Prove or disprove that that product of two upper triangular matrices is upper triangular.**[CO-1] [4]**

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