Kathmandu University

First In-Semester Exam-2025

Department of Artificial Intelligence, Panchkhal

Level: B.Tech Artificial Intelligence	Course: AIMA 104
Year: I	Semester: II
Time: 60 minutes	F.M. : 20

1. For a matrix A of order $m \times n$. Show that $Null(A)$ is a subspace of $\mathbb{R}^n$. [2]

OR

For a matrix A of order $m \times n$. Show that the eigenspace E_λ of its eigenvalue λ is a subspace of $\mathbb{R}^n$. [2]

2. Show that the transformation $T(x) = x + 3$ is not linear. [2]

3. Describe the transformation of the following matrix geometrically: $\begin{bmatrix} 1 & 0 \\ 0 & 0 \end{bmatrix}$. [2]

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4. Prove: The transformation $T : V \to W$ is linear, then $T(0) = 0$. [2]

5. Verify Rank Nullity Theorem: $\begin{bmatrix} 1 & 2 & 3 \\ 6 & 5 & 4 \\ 7 & 8 & 9 \end{bmatrix}$. [4]

6. Show that the transformation that rotates each point in $\mathbb{R}^2$, about the origin, through an angle ϕ counterclockwise, is a linear transformation by find the standard matrix of the transformation. [4]

7. Solve: $x_2 + 4x_3 = -5, \quad x_1 + 3x_2 + 5x_3 = -2, \quad 3x_1 + 7x_2 + 7x_3 = 6$. [4]

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