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Daffodil International University

Faculty of Science & Information Technology
Department of Computer Science and Engineering
Final Examination, Fall-2025
Course Code: MAT 102, Course Title: Mathematics II
Level: 01 Term: 02 Batch: 69

Time: 2 Hours **Marks: 40**

Answer All Questions

[The figures in the right margin indicate the full marks and corresponding course outcomes. All portions of each question must be answered sequentially.]

1.	a)	Given $R=\begin{bmatrix} 3 & -2 & 4 & -1 & 8 \\ 2 & 1 & -3 & 2 & 0 \\ 5 & 0 & 7 & -5 & 9 \\ -4 & -2 & 6 & 4 & 0 \end{bmatrix}$ Demonstrate REF and interpret the rank of the matrix R.	[3+1]	CO2
	b)	Given $N=\begin{bmatrix} 0.5 & 0 & -1 \\ -2 & 1 & 0 \\ 0 & 1 & 4 \end{bmatrix}$ i. Construct N^{-1} (Using Adjoint Matrix). ii. Organize the matrix N^{-1} as the sum of symmetric and skew-symmetric matrix, also justify your answer.	[4+4]	
2.		$2y-2z-t+x=0$ $2x+5y-3z-t=1$ $8y+3x-4z-t=2$ $x+5y+z+2t=3$ i. Examine the solution type of the given system of linear equations. ii. If there exist any solutions, then discover the solutions.	[4+4]	CO3
3.		Given, $Q=\begin{bmatrix} 1 & 2 & 2 \\ 1 & 2 & -1 \\ -1 & 1 & 4 \end{bmatrix}$. i. List out the eigenvalues of $\left(Q^{-2}\right)^T$. ii. Inspect the spectrum of Q^{-9} and the trace of $\left(Q^T\right)^9$.	[5+3]	
4.	a)	Apply Row Echelon technique to test the linear dependency of the vectors (1, 3, 5, 0), (-2, 5, 0, 6), (0, 1, 0, 2) and (3, 0, 7, 9) in $\mathbb{R}^4$.	[5]	CO4
	b)	$A(a,b,c)=(2a-b+3c, a-b+c, -a-b-c)$ $B(a,b,c,d)=(2a-b+3c-d, -a-b-c, a)$ $C(a,b,c)=(2ac-b, ab+c, -a-bc)$ i. Identify the Linear Transformation from the above Transformations. ii. Construct AoB and BoA.	[3+4]	CO4

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