National University of Computer & Emerging Sciences

Exam: Final   **Subject: Linear Algebra (CS)**   **Marks: 60**

<u>Semester: Fall 2014</u>   **Time:2hrs 30 min**

Note: Attempt All Questions

Question 1:

Solve the given system for X.

$$\begin{bmatrix} 1 & 2 & 3 \\ 3 & 7 & 6 \\ 1 & 0 & 8 \end{bmatrix} X = \begin{bmatrix} 1 & 4 & -2 & 0 & 3 \\ 0 & -1 & 5 & 2 & 7 \\ -3 & 6 & 8 & 9 & 0 \end{bmatrix}$$

Question 2:

Prove that $(A^{-1})^{-1} = A$, where matrix A & A^{-1} are invertible.

Question 3:

Use Cramer's rule to solve for z without solving for the unknowns x, y and w.

$$4x + y + z + w = 6$$
$$3x + 7y - z + w = 1$$
$$7x + 3y - 5z + 8w = -3$$
$$x + y + z + 2w = 3$$

Question 4:

Which of the following vectors form the basis for R^3?

$V_1 = (3,1,-4), V_2 = (2,5,6), V_3 = (6,2,-8)$, $V_4 = (1,4,8)$

Question 5: Find rank and nullity of the matrix

$$\begin{bmatrix} -3 & 6 & 0 & 12 & 15 & -9 \\ -6 & 14 & -4 & 0 & -2 & -8 \\ 2 & -5 & 2 & 4 & 6 & 1 \\ 4 & -9 & 2 & -4 & -4 & 7 \end{bmatrix}$$

Question 6:

Find an orthogonal matrix P and check the orthogonally diagonalization of $A = \begin{bmatrix} 4 & 2 & 2 \\ 2 & 4 & 2 \\ 2 & 2 & 4 \end{bmatrix}$