Matrix Assignment

1 Find the rank of the matrix

$$\begin{bmatrix} 1 & 2 & 1 & 0 \\ -4 & 4 & 3 & 0 \\ 1 & 0 & 2 & -8 \end{bmatrix}$$ [Ay (3)]

2 Examine the following system of vectors for linear dependence. If dependent find the relation

$X_1 = (1, 1, 1, 3)$ $X_2 = (1, 2, 3, 4)$

$X_3 = (2, 3, 4, 7)$ dependent

$X_1 + X_2 - X_3 = 0$

3 Test the consistency & solve

$3x + 3y + 2z = 1$, $x + 2y = 4$

$10y + 3z = -2$, $8x - 3y - z = 5$

$x = 2, y = 1, z = -4$

4 Determine the values of a & b for which the system

$$\begin{bmatrix} 3 & 2 & 1 \\ 5 & -8 & 9 \\ 2 & 1 & a \end{bmatrix} \begin{Bmatrix} x \\ y \\ z \end{Bmatrix} = \begin{Bmatrix} b \\ 3 \\ -1 \end{Bmatrix}$$

(1) has a unique solution 2) has no solution 3) has infinitely many solution

1) $a \neq -3$, 2) $a = -3$ & $b \neq \frac{1}{3}$

3) $a = -3$, $b = \frac{1}{3}$

5 Find the characteristic equation of matrix A

$$A = \begin{bmatrix} 4 & 3 & 1 \\ 2 & 1 & -2 \\ 1 & 2 & 1 \end{bmatrix}$$ Hence find A^{-1}

$$A^{-1} = \frac{1}{11}\begin{bmatrix} 5 & -1 & -7 \\ -4 & 3 & 10 \\ 3 & -5 & -2 \end{bmatrix}$$

Let $A = \begin{bmatrix} -2 & 2 & -3 \\ 2 & 1 & -6 \\ -1 & -2 & 0 \end{bmatrix}$

Find a similarity transformation that diagonalises matrix A

$$A = \begin{bmatrix} -2 & 2 & -3 \\ 2 & 1 & -6 \\ -1 & -2 & 0 \end{bmatrix}$$

a) Write note on complex matrices
1) Conjugate of complex number
2) Transpose of conjugate of matrix with example

b) Hermitian matrix
Skew Hermitian matrix

c) periodic Matrix
c) idempotent matrix

d) Unitary matrix example.

Algebraic Multiplicity

Geometric Multiplicity