Questions on Eigen Values and Eigen Vectors and Simultaneous Equations and Linear Dependency and Independency:

1.

Example 46. *Examine the following vectors for linear dependence and find the relation if it exists.*

$X_1 = (1, 2, 4)$, $X_2 = (2, -1, 3)$, $X_3 = (0, 1, 2)$, $X_4 = (-3, 7, 2)$ (*U.P., I Sem. Winter* 2002)

2.

Example 47. *Define linear dependence and independence of vectors.*

Examine for linear dependence [1, 0, 2, 1], [3, 1, 2, 1], [4, 6, 2, –4], [–6, 0, –3, –4] and find the relation between them, if possible.

3. Examine the following set of vectors for linear dependence and if dependent find relation between them

5. $X_1 = (1, 1, -1, 1)$, $X_2 = (1, -1, 2, -1)$, $X_3 = (3, 1, 0, 1)$.   (Ans. ▇▇▇▇▇▇▇▇▇▇)

6. $X_1 = (1, -1, 2, 0)$, $X_2 = (2, 1, 1, 1)$, $X_3 = (3, -1, 2, -1)$, $X_4 = (3, 0, 3, 1)$.

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7.   Show that the column vectors of following matrix A are linearly independent:

$$A = \begin{bmatrix} 1 & 0 & 0 \\ 6 & 2 & 1 \\ 4 & 3 & 2 \end{bmatrix}$$

8.   Show that the vectors $x_1 = (2, 3, 1, -1)$, $x_2 = (2, 3, 1, -2)$, $x_3 = (4, 6, 2, 1)$ are linearly dependent. Express one of the vectors as linear combination of the others.

9.   Find whether or not the following set of vectors are linearly dependent or independent:

(*i*) (1, –2), (2, 1), (3, 2)   (*ii*) (1, 1, 1, 1), (0, 1, 1, 1), (0, 0, 1, 1), (0, 0, 0, 1).

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4.

nple 72. *Find the eigen values and eigen vectors of matrix* $A = \begin{bmatrix} 3 & 1 & 4 \\ 0 & 2 & 6 \\ 0 & 0 & 5 \end{bmatrix}$

5.

Example 73. *Find all the Eigen values and Eigen vectors of the matrix*

$$A = \begin{bmatrix} -2 & 2 & -3 \\ 2 & 1 & -6 \\ -1 & -2 & 0 \end{bmatrix}$$ (*AMIETE, Dec.* 2009)

6.

Example 74. *Find the eigen values and the corresponding eigen vectors of the matrix*

$$\begin{bmatrix} -2 & 5 & 4 \\ 5 & 7 & 5 \\ 4 & 5 & -2 \end{bmatrix}$$

7.

Example 75. *Find all the eigen values and eigen vectors of the matrix*

$$\begin{bmatrix} 2 & -1 & 1 \\ -1 & 2 & -1 \\ 1 & -1 & 2 \end{bmatrix}$$

8.