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Date:

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Answer No 1 :

Solution: $v_1 = \begin{pmatrix} 1 \\ 6 \\ 0 \end{pmatrix}, v_2 = \begin{pmatrix} 6 \\ 0 \\ 3 \end{pmatrix}$ $v_3 = \begin{pmatrix} 0 \\ 3 \\ 0 \end{pmatrix}$

$= 1D_1(6.0.3) + 1D_2(6.0.3) + 1D_3(6.0.3)$

Thee desired candidets of $R_3$ is
(1.6, 6.6, 0.6)
similarly
(1.0, 6.0, 0.0)
and (1.3, 6.3, 0.3).

$$\text{So } A = \begin{bmatrix} 1.6 & 1.0 & 1.3 \\ 6.6 & 6.0 & 6.3 \\ 0.6 & 0.0 & 0.3 \end{bmatrix}$$

So you can see each column of above $R_3$ vector are lenearly dependent.

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Answer No 2:-

In matrix form we can write as:

$450x_1 + 250x_2 = 1000$

$400x_1 + 350x_2 = 500$

$$\underbrace{\begin{bmatrix} 450 & 250 \\ 400 & 350 \end{bmatrix}}_{A} \underbrace{\begin{bmatrix} x_1 \\ x_2 \end{bmatrix}}_{X} = \underbrace{\begin{bmatrix} 1000 \\ 500 \end{bmatrix}}_{B}$$

$\Rightarrow \quad X = A^{-1} . B$

$$\begin{pmatrix} x_1 \\ x_2 \end{pmatrix} = \begin{bmatrix} 450 & 250 \\ 400 & 350 \end{bmatrix}^{-1} \begin{bmatrix} 1000 \\ 500 \end{bmatrix}$$

$$adj(A) = \begin{bmatrix} 350 & -250 \\ -400 & 450 \end{bmatrix}, \quad |A| = \begin{vmatrix} 450 & 250 \\ 400 & 350 \end{vmatrix}$$

$|A| = (450)(350) - (250)(400) = 157,500 - 100000$
$= 57500$

$$\Rightarrow \begin{pmatrix} x_1 \\ x_2 \end{pmatrix} = \frac{1}{57500} \begin{bmatrix} 350 & -250 \\ -400 & 450 \end{bmatrix} \begin{bmatrix} 1000 \\ 500 \end{bmatrix}$$

$$\begin{bmatrix} x_1 \\ x_2 \end{bmatrix} = \frac{1}{57500} \begin{bmatrix} 350000 - 125000 \\ -400000 + 225000 \end{bmatrix} = \begin{bmatrix} 225000 \\ -175000 \end{bmatrix}$$

$x_1 = 225000, \quad x_2 = 175000$

Total cost $= x_1 + x_2 = 400000$

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Answer No 3:-

A vector space is a collection of objects called vectors, which maybe added together and multiplied (scaled) by numbers scalers are often taken to be real numbers but there are also vector spaces with with scaler multiplication by complex numbers ratinal numbers or generally any field.

A)

solution: $k\begin{bmatrix} a & b \\ c & d \end{bmatrix} = \begin{pmatrix} ka & b \\ ke & d \end{pmatrix}$ for $k \in R$

according to the def, of vector space if any vector space then it will become vector space so in this case $\begin{pmatrix} ka & b \\ kc & d \end{pmatrix}$ is not a vector space

ie $k\begin{pmatrix} a & b \\ c & d \end{pmatrix} = \begin{pmatrix} ka & kb \\ kc & kd \end{pmatrix}$

B) Solution:-

Let $p(x) = a_1 x^3 + a_2 x^2 + x + c$

which is defined and correct according to the defination of vector space.

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4)

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Answer No 4:

Let $M = \begin{pmatrix} a & b \\ c & d \end{pmatrix}_{2\times 2}$

(a) $|M| = \begin{vmatrix} a & b \\ c & d \end{vmatrix} = ad - bc$

if we take inverse of M ie $M^{-1} = \dfrac{\begin{pmatrix} d & -b \\ -c & a \end{pmatrix}}{ad-bc}$

ie $M \cdot M^{-1} = I$

(b) All 2x2 idantity matrices are:

$\begin{pmatrix} 1 & 0 \\ 0 & 1 \end{pmatrix}, \begin{pmatrix} -1 & 0 \\ 0 & -1 \end{pmatrix}, \begin{pmatrix} 0 & 1 \\ -1 & 0 \end{pmatrix}$

and $\begin{pmatrix} 0 & -1 \\ 1 & 0 \end{pmatrix}$

(c) All 2x2 matrices for zero det. are:

$\begin{bmatrix} 0 & 0 \\ 0 & 0 \end{bmatrix}, \begin{bmatrix} 0 & 1 \\ 0 & 0 \end{bmatrix}, \begin{bmatrix} 0 & 0 \\ 1 & 0 \end{bmatrix}, \begin{pmatrix} 0 & 0 \\ 0 & 1 \end{pmatrix}$

(d)

$\text{Det } A = \begin{vmatrix} 1 & 1 & 1 \\ 6 & 0 & 6 \\ 3 & 1 & 0 \end{vmatrix}$ ~~Eliminate $R_1$~~

$= 1\cdot0\cdot0 + 1\cdot6\cdot3 + 1\cdot6\cdot1 - 1\cdot0\cdot3 - 1\cdot6\cdot0 - 1\cdot6\cdot1 =$

$0 + 18 + \cancel{6} - 0 - 0 - \cancel{6} = \boxed{18}$

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