1)

DATE:

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Q No 1:

For R^3, $V_1 \times V_2 \times V_3 = \begin{pmatrix}1\\6\\0\end{pmatrix}\begin{pmatrix}6\\0\\4\end{pmatrix}\begin{pmatrix}6\\4\\3\end{pmatrix}$

$= 1D_1(6-0-4) + 1D_2(6\cdot 0-4) + 1D_3(6\cdot 3\cdot 4)$

The desired Coordinates of R_3:

$(1\cdot 6, 6\cdot 6, 0-6)$

Similarly: $(1-0, 6-0, 0-0)$

and $(1\cdot 4, 6\cdot 4, 0-4)$

So $A = \begin{bmatrix} 1\cdot 6 & 1\cdot 0 & 1\cdot 4 \\ 6\cdot 6 & 6-0 & 6\cdot 4 \\ 0-6 & 0-0 & 0-4 \end{bmatrix}$

So you can see each column of R_3 vectors are linearly independent.

Answer No 2:-

~~Let~~ In matrix form we can write as:

$450x_1 + 250x_2 = 1000$

$400x_1 + 350x_2 = 500$

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

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

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

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

$$|A| = (450)(350) - (250)(400) = 157500 - 100000$$

$$= 57500$$

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

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

$x_1 = 225000, \; x_2 = 175000$

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 may be added together and multiplied (scaled) by numbers scalars are often taken to be real numbers but there are also vector spaces with scaler multiplication by complex numbers rational numbers or generally any field.

A)

$$k \begin{bmatrix} a & b \\ c & d \end{bmatrix} = \begin{bmatrix} ka & b \\ kc & d \end{bmatrix} \text{ for } k \in R$$

according to the defination 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.

Answer No 4 :-

$$\text{let } M = \begin{bmatrix} a & b \\ c & d \end{bmatrix}_{2\times 2}$$

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

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

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

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

All 2x2 matrices for zero det are:

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

$$\text{Det } A = \begin{vmatrix} 1 & 1 & 1 \\ 6 & 0 & 6 \\ 4 & 1 & 3 \end{vmatrix}$$

$= 1.0.3 + 1.6.4 + 1.6.1 - 1.0.4 - 1.6.3$

$- 1.6.1 = 0 + 24 + 6 - 0 - 18 - 6$

$\boxed{= 6}$