

Question

Find the solutions for the following systems of equations.

$$(i) \begin{pmatrix} 2 & 4 & 1 \\ 1 & 1 & 1 \\ 2 & 3 & 1 \end{pmatrix} \begin{pmatrix} x_1 \\ x_2 \\ x_3 \end{pmatrix} = \begin{pmatrix} 5 \\ 6 \\ 6 \end{pmatrix}$$

$$(ii) \begin{pmatrix} 5 & 15 & -10 \\ -2 & -2 & -4 \\ 3 & 4 & 1 \end{pmatrix} \begin{pmatrix} x_1 \\ x_2 \\ x_3 \end{pmatrix} = \begin{pmatrix} 0 \\ 4 \\ -5 \end{pmatrix}$$

$$(iii) \begin{pmatrix} 1 & -2 & 1 & -5 \\ 3 & -6 & 4 & -14 \\ -2 & 4 & -4 & 9 \\ 4 & -7 & 5 & -18 \end{pmatrix} \begin{pmatrix} x_1 \\ x_2 \\ x_3 \\ x_4 \end{pmatrix} = \begin{pmatrix} 0 \\ 4 \\ 5 \\ 6 \end{pmatrix}$$

$$(iv) \begin{pmatrix} 2 & 1 & -1 \\ 1 & -2 & 1 \\ 4 & -3 & 1 \end{pmatrix} \begin{pmatrix} x_1 \\ x_2 \\ x_3 \end{pmatrix} = \begin{pmatrix} 1 \\ 3 \\ 5 \end{pmatrix}$$

$$(v) \begin{pmatrix} 2 & -1 & 3 \\ 1 & 1 & -3 \\ 5 & -1 & 3 \end{pmatrix} \begin{pmatrix} x_1 \\ x_2 \\ x_3 \end{pmatrix} = \begin{pmatrix} 4 \\ -1 \\ 7 \end{pmatrix}$$

$$(vi) \begin{pmatrix} 5 & -2 & 7 \\ -3 & 5 & -1 \\ 1 & 1 & -3 \end{pmatrix} \begin{pmatrix} x_1 \\ x_2 \\ x_3 \end{pmatrix} = \begin{pmatrix} 0 \\ 0 \\ 0 \end{pmatrix}$$

$$(vii) \begin{pmatrix} 1 & -2 & 3 & -4 \\ 2 & 1 & -1 & 1 \\ 3 & -1 & 2 & -1 \end{pmatrix} \begin{pmatrix} x_1 \\ x_2 \\ x_3 \\ x_4 \end{pmatrix} = \begin{pmatrix} 0 \\ 0 \\ 0 \end{pmatrix}$$

Answer

Solutions

$$(i) \begin{pmatrix} 2 \\ -1 \\ 5 \end{pmatrix}$$

$$(ii) \begin{pmatrix} -3 \\ 1 \\ 0 \end{pmatrix}$$

$$\text{(iii)} \begin{pmatrix} 52 \\ -11 \\ -9 \\ 13 \end{pmatrix}$$

(iv) no solutions

$$\text{(v)} \begin{pmatrix} 1 \\ 3t - 1 \\ t \end{pmatrix}$$

$$\text{(vi)} \begin{pmatrix} 0 \\ 0 \\ 0 \end{pmatrix}$$

$$\text{(vii)} \begin{pmatrix} -t \\ 7t \\ 5t \\ 0 \end{pmatrix}$$