Algebra of Matrices Ex 5.3 Q24(i)

Given,

$$\begin{bmatrix}1 & 1 & x\end{bmatrix}\begin{bmatrix}1 & 0 & 2\\ 0 & 2 & 1\\ 2 & 1 & 0\end{bmatrix}\begin{bmatrix}1\\ 1\\ 1\end{bmatrix}=0$$

$$\Rightarrow \quad \begin{bmatrix}1+0+2x & 0+2+x & 2+1+0\end{bmatrix}\begin{bmatrix}1\\ 1\\ 1\end{bmatrix}=0$$

$$\Rightarrow \quad \begin{bmatrix}2x+1 & 2+x & 3\end{bmatrix}\begin{bmatrix}1\\ 1\\ 1\end{bmatrix}=0$$

$$\Rightarrow \quad \begin{bmatrix}2x+1+2+x+3\end{bmatrix}=0$$

$$\Rightarrow \quad 3x+6=0$$

$$\Rightarrow \quad x=-\frac{6}{3}$$

$$\Rightarrow \quad x=-2$$

Algebra of Matrices Ex 5.3 Q24(ii)

$$\text{Given that } \begin{bmatrix}2 & 3\\ 5 & 7\end{bmatrix}\begin{bmatrix}1 & -3\\ -2 & 4\end{bmatrix}=\begin{bmatrix}-4 & 6\\ -9 & x\end{bmatrix}$$

By multiplication of matrices, we have,

$$\begin{bmatrix}2\times1+3\times(-2) & 2\times(-3)+3\times4\\ 5\times1+7\times(-2) & 5\times(-3)+7\times4\end{bmatrix}=\begin{bmatrix}-4 & 6\\ -9 & x\end{bmatrix}$$

$$\Rightarrow\begin{bmatrix}-4 & 6\\ -9 & 13\end{bmatrix}=\begin{bmatrix}-4 & 6\\ -9 & x\end{bmatrix}$$

$$\Rightarrow x=13$$

Algebra of Matrices Ex 5.3 Q25

Given,

$$\begin{bmatrix} x & 4 & 1 \end{bmatrix}\begin{bmatrix} 2 & 1 & 2 \\ 1 & 0 & 2 \\ 0 & 2 & -4 \end{bmatrix}\begin{bmatrix} x \\ 4 \\ -1 \end{bmatrix} = 0$$

$$\Rightarrow \quad \begin{bmatrix} 2x+4+0 & x+0+2 & 2x+8-4 \end{bmatrix}\begin{bmatrix} x \\ 4 \\ -1 \end{bmatrix} = 0$$

$$\Rightarrow \quad \begin{bmatrix} 2x+4 & x+2 & 2x+4 \end{bmatrix}\begin{bmatrix} x \\ 4 \\ -1 \end{bmatrix} = 0$$

$$\Rightarrow \quad \left[(2x+4)x + 4(x+2) - 1(2x+4)\right] = 0$$

$$\Rightarrow \quad 2x^2 + 4x + 4x + 8 - 2x - 4 = 0$$

$$\Rightarrow \quad 2x + 6x + 4 = 0$$

$$\Rightarrow \quad 2x^2 + 2x + 4x + 4 = 0$$

$$\Rightarrow \quad 2x(x+1) + 4(x+1) = 0$$

$$\Rightarrow \quad (x+1)(2x+4) = 0$$

$$\Rightarrow \quad x + 1 = 0 \text{ or } 2x + 4 = 0$$

$$\Rightarrow \quad x = -1 \text{ or } x = -2$$

Hence, $x = -1$ or -2

Algebra of Matrices Ex 5.3 Q26

Given,

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

$$\Rightarrow \quad \begin{bmatrix} 0-2+x & 1-1+x & -1-3+x \end{bmatrix}\begin{bmatrix} 0 \\ 1 \\ 1 \end{bmatrix} = 0$$

$$\Rightarrow \quad \begin{bmatrix} x-2 & x & x-4 \end{bmatrix}\begin{bmatrix} 0 \\ 1 \\ 1 \end{bmatrix} = 0$$

$$\Rightarrow \quad \left[0(x-2) + x.1 + 1.(x-4)\right] = 0$$

$$\Rightarrow \quad 0 + x + x - 4 = 0$$

$$\Rightarrow \quad 2x - 4 = 0$$

$$\Rightarrow \quad x = 2$$

Hence,

$$x = 2$$

********** END **********