

11/06/2023

4.4 Homework

$$1. P_B = \begin{bmatrix} 3 & -4 \\ -5 & 6 \end{bmatrix} \Rightarrow \begin{bmatrix} 3 & -4 \\ -5 & 6 \end{bmatrix} \begin{bmatrix} 5 \\ 3 \end{bmatrix} = \begin{bmatrix} 3 \\ -7 \end{bmatrix}$$

$$3. B = \left\{ \begin{bmatrix} 1 \\ -4 \\ 3 \end{bmatrix}, \begin{bmatrix} 5 \\ 2 \\ -2 \end{bmatrix}, \begin{bmatrix} 4 \\ -7 \\ 0 \end{bmatrix} \right\} \Rightarrow \begin{bmatrix} 1 & 5 & 4 \\ -4 & 2 & -7 \\ 3 & -2 & 0 \end{bmatrix} \begin{bmatrix} 3 \\ 0 \\ -1 \end{bmatrix} = \begin{bmatrix} -1 \\ -5 \\ 9 \end{bmatrix}$$

$$6. \left[\begin{array}{cc|c} 1 & 5 & 4 \\ -2 & -6 & 2 \end{array} \right] \sim \left[\begin{array}{cc|c} 1 & 0 & -6 \\ 0 & 1 & 2 \end{array} \right]$$

$$[x]_B = \begin{bmatrix} -6 \\ 2 \end{bmatrix}$$

$$7. \left[\begin{array}{ccc|c} 1 & -3 & 2 & 8 \\ -1 & 4 & -2 & -9 \\ -3 & 9 & 4 & 6 \end{array} \right] \sim [x]_B = \begin{bmatrix} -1 \\ -1 \\ 3 \end{bmatrix}$$

$$\left[\begin{array}{ccc|c} 1 & -3 & 2 & 8 \\ 0 & 1 & 6 & -1 \\ 0 & 6 & 10 & 36 \end{array} \right]$$

$$C_1: 3+6=9$$

$$C_2: -1$$

9.

$$\begin{bmatrix} 2 & 1 \\ 2 & 8 \end{bmatrix}$$

11.

$$\left[\begin{array}{cc|c} 3 & -4 & 2 \\ -5 & 6 & -6 \end{array} \right]$$

$$[x]_B = P_B^{-1}x$$

$$\left[\begin{array}{cc|c} -3 & -2 & 2 \\ -5/2 & -3/2 & -6 \end{array} \right]$$

$$= \begin{bmatrix} 6 \\ 4 \end{bmatrix}$$

27.

$$\begin{bmatrix} 2 \\ 8 \\ 1 \end{bmatrix}$$

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

$$\begin{bmatrix} -1 \\ 2 \\ -1 \\ 0 \end{bmatrix}$$

$$\left[\begin{array}{ccc|c} 2 & 0 & -1 & 0 \\ 0 & -3 & 2 & 0 \\ 0 & 1 & -1 & 0 \\ -1 & 2 & 0 & 0 \end{array} \right] \sim \left[\begin{array}{ccc|c} 2 & -3 & -1 & 0 \\ 0 & 0 & -1 & 0 \\ 0 & 1 & -1 & 0 \\ 0 & 0 & 4 & 0 \end{array} \right]$$

$$(x_1, x_2, x_3) = (0, 0, 0)$$

Linearly independent

32.

a.

$$\begin{bmatrix} 1 \\ 0 \\ 1 \end{bmatrix} \begin{bmatrix} 0 \\ 1 \\ -3 \end{bmatrix} \begin{bmatrix} 1 \\ 1 \\ -3 \end{bmatrix}$$

$$\begin{bmatrix} 1 & 0 & 1 \\ 0 & 1 & 1 \\ 1 & -3 & -3 \end{bmatrix} \sim \begin{bmatrix} 1 & 0 & 1 \\ 0 & 1 & 1 \\ 0 & 0 & -1 \end{bmatrix}$$

 \Rightarrow linearly independent

b.

$$\begin{bmatrix} 1 \\ 0 \\ 1 \end{bmatrix} + \begin{bmatrix} 0 \\ 1 \\ -3 \end{bmatrix} + 2 \begin{bmatrix} 1 \\ 1 \\ -3 \end{bmatrix} = \begin{bmatrix} 1 \\ 3 \\ -10 \end{bmatrix}$$

$$q(t) = 1 + 3t - 10t^2$$

$$\textcircled{8} \quad \cancel{q(t)} + 3t + \dots$$