Homework Solutions

4.6: 21, 29, 45

21) $\begin{bmatrix} 2 & 2 \\ -1 & -1 \end{bmatrix}\begin{bmatrix} 1 & 1 \\ -1 & -1 \end{bmatrix} = \begin{bmatrix} 0 & 0 \\ 0 & 0 \end{bmatrix}$

A B

$AB \neq I$

$B \neq A^{-1}$

→ Bonus solution for 4.5 #21

4.6: 21 $\begin{bmatrix} 1 & -1 \\ 1 & -2 \end{bmatrix}^{-1} = \frac{1}{-2+1}\begin{bmatrix} -2 & 1 \\ -1 & 1 \end{bmatrix} = \begin{bmatrix} 2 & -1 \\ 1 & -1 \end{bmatrix}$

$-2+1 = -1$

$\begin{bmatrix} 2 & -1 \\ 1 & -1 \end{bmatrix}\begin{bmatrix} 5 \\ 7 \end{bmatrix} = \begin{bmatrix} 10-7 \\ 5-7 \end{bmatrix} = \begin{bmatrix} 3 \\ -2 \end{bmatrix} = \begin{bmatrix} x_1 \\ x_2 \end{bmatrix}$

29 $Ax - C = B$

$Ax = B + C$

$x = A^{-1}(B+C)$

$B + C = \begin{bmatrix} 14 \\ 8 \end{bmatrix} + \begin{bmatrix} 4 \\ 3 \end{bmatrix} = \begin{bmatrix} 18 \\ 11 \end{bmatrix}$

$A^{-1} = \frac{1}{4-6}\begin{bmatrix} 1 & -2 \\ -3 & 4 \end{bmatrix} = \begin{bmatrix} -\frac{1}{2} & 1 \\ \frac{3}{2} & -2 \end{bmatrix}$

$4-6 = -2$

$X = \begin{bmatrix} -\frac{1}{2} & 1 \\ \frac{3}{2} & -2 \end{bmatrix}\begin{bmatrix} 18 \\ 11 \end{bmatrix} = \begin{bmatrix} -9+11 \\ 27-22 \end{bmatrix} = \begin{bmatrix} 2 \\ 5 \end{bmatrix}$

45 $Ax = b$

$A = \begin{bmatrix} -2 & 4 \\ 6 & -12 \end{bmatrix}$ $\det(A) = 0$ Singular, no inverse

$= 24 - 24$

Solve using augmented Gauss-Jordan

$$\left[\begin{array}{cc|c} -2 & 4 & -5 \\ 6 & -12 & 15 \end{array}\right] \begin{matrix} -\frac{1}{2}R1 \\ R2+3R1 \end{matrix} \left[\begin{array}{cc|c} 1 & -2 & \frac{5}{2} \\ 0 & 0 & 0 \end{array}\right]$$

infinite solutions

Let $x_2 = t$ $x_1 - 2t = \frac{5}{2}$

$x_1 = \frac{5}{2} + 2t$

$$\begin{bmatrix} x_1 = \frac{5}{2} + t \\ x_2 = t \end{bmatrix}$$