

Inverse Matrices – Answers

Problem 1

(a) $A^{-1} = \begin{bmatrix} 2 & -1 \\ -3 & 2 \end{bmatrix}$

(b) A is not invertible.

(c) $A^{-1} = \begin{bmatrix} -2 & 1 \\ \frac{3}{2} & -\frac{1}{2} \end{bmatrix}$

(d) $A^{-1} = \begin{bmatrix} 6 & 11 & 9 \\ -2 & -5 & -4 \\ 1 & 1 & 1 \end{bmatrix}$

(e) A is not invertible.

(f) $A^{-1} = \begin{bmatrix} 1 & -2 & 6 & -11 \\ 0 & 1 & -3 & 6 \\ 0 & 0 & 1 & -2 \\ 0 & 0 & 0 & 1 \end{bmatrix}$

Problem 2

(a) $X = \begin{bmatrix} 3 \\ -4 \end{bmatrix}$

(b) $X = \begin{bmatrix} 3 & -3 \\ -4 & 5 \end{bmatrix}$

(c) $X = \begin{bmatrix} -2 & 0 & -6 \\ 2 & 1 & 3 \end{bmatrix}$

(d) $X = \begin{bmatrix} 2 \\ 0 \\ 1 \end{bmatrix}$

(e) $X = \begin{bmatrix} 1 & -13 & 4 \\ 1 & 6 & -1 \\ 1 & -1 & 1 \end{bmatrix}$

(f) $X = \begin{bmatrix} 21 \\ -11 \\ 4 \\ -3 \end{bmatrix}$

Problem 4

(a) $A^4 = 0$.

(b) $I_4 + A + A^2 + A^3 = \begin{bmatrix} 1 & 1 & 1 & 1 \\ 0 & 1 & 1 & 1 \\ 0 & 0 & 1 & 1 \\ 0 & 0 & 0 & 1 \end{bmatrix},$

$$(c) (I_4 - A)(I_4 + A + A^2 + A^3) = I_4$$

$$(I_4 - A)^{-1} = \begin{bmatrix} 1 & 1 & 1 & 1 \\ 0 & 1 & 1 & 1 \\ 0 & 0 & 1 & 1 \\ 0 & 0 & 0 & 1 \end{bmatrix}$$