

DS - Week 4 - Assignment

$$\begin{aligned} \textcircled{1} \quad x + 2y - 3z &= 5 \\ 2x + y - 3z &= 13 \\ -x + y &= -8 \end{aligned}$$

This can be written in Matrix form as below:

$$\begin{bmatrix} 1 & 2 & -3 \\ 2 & 1 & -3 \\ -1 & 1 & 0 \end{bmatrix} \begin{bmatrix} x \\ y \\ z \end{bmatrix} = \begin{bmatrix} 5 \\ 13 \\ -8 \end{bmatrix} \quad \text{i.e. } Ax = b$$

Since $A^{-1}A = I$ and $Ix = x$, we can write the above:

$$x = A^{-1}b = \begin{bmatrix} 1 & 2 & -3 \\ 2 & 1 & -3 \\ -1 & 1 & 0 \end{bmatrix}^{-1} * \begin{bmatrix} 5 \\ 13 \\ -8 \end{bmatrix}$$

But A^{-1} is not possible since it is a Singular matrix.

Therefore we cannot solve this equation.

$$\textcircled{3} \quad \begin{matrix} (3 \times 2) \\ A = \begin{bmatrix} 4 & 3 \\ -3 & 5 \\ 0 & 1 \end{bmatrix} \end{matrix} \quad \begin{matrix} (2 \times 2) \\ B = \begin{bmatrix} 1 & 4 \\ 3 & -2 \end{bmatrix} \end{matrix} \quad \text{Solve } AB.$$

$$A \times B = \begin{bmatrix} (4 \times 1 + -3 \times 3) & (4 \times 4 + -3 \times -2) \\ (-3 \times 1 + 5 \times 3) & (-3 \times 4 + 5 \times -2) \\ (0 \times 1 + 1 \times 3) & (0 \times 4 + 1 \times -2) \end{bmatrix} = \begin{bmatrix} (4-9) & (16+6) \\ (-3+15) & (-12-10) \\ (0+3) & (0-2) \end{bmatrix}$$

$$= \begin{bmatrix} -5 & 22 \\ 12 & -22 \\ 3 & -2 \end{bmatrix}$$