

1.

Solve System of linear equations

$$-x - 2y + z = -1$$

$$2x + 3y = 2$$

$$y - 2z = 0$$

Solⁿ

$$Ax = B$$

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

augmented matrix.

$$(A|B) = \left[\begin{array}{ccc|c} -1 & -2 & 1 & -1 \\ 2 & 3 & 0 & 2 \\ 0 & 1 & -2 & 0 \end{array} \right]$$

$$R_1 \rightarrow -R_1 \quad (A|B) = \left[\begin{array}{ccc|c} 1 & 2 & -1 & 1 \\ 2 & 3 & 0 & 2 \\ 0 & 1 & -2 & 0 \end{array} \right]$$

$$R_2 \leftrightarrow R_3 \quad (A|B) = \left[\begin{array}{ccc|c} 1 & 2 & -1 & 1 \\ 0 & 1 & -2 & 0 \\ 2 & 3 & 0 & 2 \end{array} \right]$$

$$R_3 \rightarrow R_3 - 2R_1 \quad (A|B) = \left[\begin{array}{ccc|c} 1 & 2 & -1 & 1 \\ 0 & 1 & -2 & 0 \\ 0 & -1 & 2 & 0 \end{array} \right]$$

$$R_3 \rightarrow R_2 + R_3 \quad (A|B) = \left[\begin{array}{ccc|c} 1 & 2 & -1 & 1 \\ 0 & 1 & -2 & 0 \\ 0 & 0 & 0 & 0 \end{array} \right]$$

$\Rightarrow \text{RANK}(A) = \text{RANK}(A|B)$
System has solutions.

$$x + 2y - z = 1$$

$$y = 2z$$

$$0 = 0$$

$$x + 2y - z = 1 \quad \text{--- (1)}$$

$$y = 2z \quad \text{--- (2)}$$

by (1) & (2)

$$x + 2(2z) - z = 1$$

$$x + 3z = 1$$

$$z = \frac{1-x}{3} \quad \text{--- (3)}$$

$$\text{by (3) \& (2)} \quad y - 2\left(\frac{1-x}{3}\right) = 0 \Rightarrow y = \frac{2-2x}{3}$$

generic Solⁿ $\Rightarrow \left(x, \frac{2-2x}{3}, \frac{1-x}{3} \right) \Rightarrow \text{if } x = \lambda \Rightarrow \left(\lambda, \frac{2-2\lambda}{3}, \frac{1-\lambda}{3} \right)$