

3. If the system of equations  
 $x - ky - z = 0$   
 $kx - y - z = 0$   
 $x + y - z = 0$   
 has a non-zero solution, then possible values of  $k$  are.

Sol<sup>n</sup>

$$AX = B$$

$$A = \begin{bmatrix} 1 & -k & -1 \\ k & -1 & -1 \\ 1 & 1 & -1 \end{bmatrix}; B = \begin{bmatrix} 0 \\ 0 \\ 0 \end{bmatrix}; X = \begin{bmatrix} x \\ y \\ z \end{bmatrix}$$

Non-zero solution

$$|A| = 0$$

$$\begin{vmatrix} 1 & -k & -1 \\ k & -1 & -1 \\ 1 & 1 & -1 \end{vmatrix} = 0$$

$$C_1 \rightarrow C_1 - C_2 \quad \begin{vmatrix} 1+k & -k-1 & -1 & -1 \\ 0 & k & -1 & -1 \\ 0 & 1 & 1 & -1 \end{vmatrix} = 0$$

$$C_2 \rightarrow C_2 + C_3 \quad \begin{vmatrix} 1+k & -k-1 & -1 & -1 \\ 1+k & -2 & -1 & -1 \\ 0 & 0 & -1 & -1 \end{vmatrix} = 0$$

$$\Rightarrow 2(k+1) - (k+1)^2 = 0$$

$$\Rightarrow (k+1)(2-k-1) = 0$$

$$\Rightarrow k = -1 \quad \text{and} \quad k = 1$$

$$\Rightarrow k = \pm 1$$