

## Step-1

Given system is  $2x - 3y = 3$

$$4x - 5y + z = 7$$

$$2x - y - 3z = 5$$

We have to solve this system by applying elimination and back-substitution.

## Step-2

Given system can be written as

$$\begin{pmatrix} 2 & -3 & 0 & 3 \\ 4 & -5 & 1 & 7 \\ 2 & -1 & -3 & 5 \end{pmatrix}$$

Subtract  $\sim 2$  times the row 1 from the row 2  $\rightarrow$  (1)

Subtract  $\sim 1$  time the row 1 from the row 3  $\rightarrow$  (2)

$$\rightarrow \begin{pmatrix} 2 & -3 & 0 & 3 \\ 0 & 1 & 1 & 1 \\ 0 & 2 & -3 & 2 \end{pmatrix}$$

Subtract  $\sim 2$  times the row 2 from the row 3  $\rightarrow$  (3)

$$\rightarrow \begin{pmatrix} 2 & -3 & 0 & 3 \\ 0 & 1 & 1 & 1 \\ 0 & 0 & -5 & 0 \end{pmatrix}$$

which is upper triangular form.

$$\begin{pmatrix} \boxed{2} & -3 & 0 & 3 \\ 0 & \boxed{1} & 1 & 1 \\ 0 & 0 & \boxed{-5} & 0 \end{pmatrix}$$

The pivots are circled in

That is  $\boxed{2, 1, -5}$ .

## Step-3

Back ward substitution:-

From above upper triangular form, we have

$$2x - 3y = 3$$

$$y + z = 1$$

$$-5z = 0$$

$$-5z = 0 \Rightarrow \boxed{z = 0}$$

#### Step-4

$$y + z = 1$$

$$\Rightarrow y + 0 = 1$$

$$\Rightarrow \boxed{y = 1}$$

$$2x - 3y = 3$$

$$\Rightarrow 2x - 3(1) = 3$$

$$\Rightarrow \boxed{x = 3}$$

Hence the solution is  $\boxed{x = 3, y = 1, z = 0}$

#### Step-5

Operations are

- (i) Subtract  $\hat{\sim}2\hat{\epsilon}^{\text{TM}}$  times the row 1 from the row 2
- (ii) Subtract  $\hat{\sim}1\hat{\epsilon}^{\text{TM}}$  time the row 1 from the row 3 and
- (iii) Subtract  $\hat{\sim}2\hat{\epsilon}^{\text{TM}}$  times the row 2 from the row 3