#### Step-1

(i)

Given system is

$$u + v + w = 6$$

$$u + 2v + 2w = 11$$

$$2u + 3v - 4w = 3$$

We have to find the solution to this system by applying elimination.

#### Step-2

Given system can be written as

$$\begin{bmatrix} 1 & 1 & 1 & 6 \\ 1 & 2 & 2 & 11 \\ 2 & 3 & -4 & 3 \end{bmatrix}$$

apply 
$$R_2 \rightarrow R_2$$
-  $R_1$ ,  $R_3 \rightarrow R_3$ -  $2R_1$ 

$$\begin{bmatrix}
1 & 1 & 1 & 6 \\
0 & 1 & 1 & 5 \\
0 & 1 & -6 & -9
\end{bmatrix}$$

apply 
$$R_3 \rightarrow R_3 - R_2$$

$$\begin{bmatrix}
1 & 1 & 1 & 6 \\
0 & 1 & 1 & 5 \\
0 & 0 & -7 & -14
\end{bmatrix}$$

which is upper triangular form.

that is 
$$u+v+w=6$$
  
 $v+w=5$   
 $-7w=-14$ 

## Step-3

By back-ward substitution, we have

$$-7w = -14$$

$$\Rightarrow w = 2$$

$$v + w = 5$$

$$\Rightarrow v + 2 = 5$$

$$\Rightarrow v = 3$$

$$u+v+w=6$$

$$\Rightarrow u+3+2=6$$

$$\Rightarrow u = 1$$

Solutions are u = 1, v = 3, w = 2

#### Step-4

(ii)

Given system is

$$u + v + w = 7$$

$$u + 2v + 2w = 10$$

$$2u + 3v - 4w = 3$$

We have to find the solution to this system by applying elimination.

### Step-5

Given system can be written as

$$\begin{bmatrix} 1 & 1 & 1 & 7 \\ 1 & 2 & 2 & 10 \\ 2 & 3 & -4 & 3 \end{bmatrix}$$

apply 
$$R_2 \rightarrow R_2 - R_1, R_3 \rightarrow R_3 - 2R_1$$

$$\begin{bmatrix}
1 & 1 & 1 & 7 \\
0 & 1 & 1 & 3 \\
0 & 1 & -6 & -11
\end{bmatrix}$$

apply 
$$R_3 \rightarrow R_3 - R_2$$

$$\begin{bmatrix}
1 & 1 & 1 & 7 \\
0 & 1 & 1 & 3 \\
0 & 0 & -7 & -11
\end{bmatrix}$$

which is upper triangular form.

that is 
$$u+v+w=7$$
  
 $v+w=3$   
 $-7w=-14$ 

# Step-6

By back-ward substitution, we have

$$-7w = -14$$

$$\Rightarrow w = 2$$

$$v + w = 3$$

$$\Rightarrow v+2=3$$

$$\Rightarrow v = 1$$

$$u + v + w = 7$$

$$\Rightarrow u+1+2=7$$

$$\Rightarrow u = 4$$

solution are u = 4, v = 1, w = 2