Gauss Elimination Method.

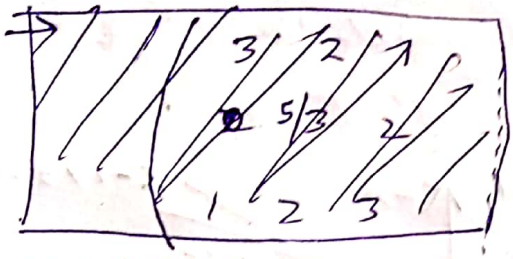
1. Solve the following equations (system of equations) by the process of elimination.

$$3x + 2y + z = 10$$
$$2x + 3y + 2z = 14$$
$$x + 2y + 3z = 14$$

Soln:

The augmented matrix is given by,

$$\left(\begin{array}{ccc|c} 3 & 2 & 1 & 10 \\ 2 & 3 & 2 & 14 \\ 1 & 2 & 3 & 14 \end{array}\right) \left[\begin{pmatrix} 3 & 2 & 1 \\ 2 & 3 & 2 \\ 1 & 2 & 3 \end{pmatrix}\begin{pmatrix} x \\ y \\ z \end{pmatrix} = \begin{pmatrix} 10 \\ 14 \\ 14 \end{pmatrix}\right]$$



$$\rightarrow \left(\begin{array}{ccc|c} 3 & 2 & 1 & 10 \\ 0 & \frac{5}{3} & \frac{4}{3} & \frac{22}{3} \\ 0 & \frac{4}{3} & \frac{8}{3} & \frac{32}{3} \end{array}\right) \begin{array}{l} R_2 \leftarrow R_2 - \frac{2}{3}R_1 \\ R_3 \leftarrow R_3 - \frac{1}{3}R_1 \end{array}$$

$$\rightarrow \left(\begin{array}{ccc|c} 3 & 2 & 1 & 10 \\ 0 & \frac{5}{3} & \frac{4}{3} & \frac{22}{3} \\ 0 & 0 & \frac{24}{15} & \frac{72}{15} \end{array}\right) R_3 \leftarrow R_3 - \frac{4}{5}R_2$$

By back substitution method,

$$\frac{24}{15}z = \frac{72}{15} \Rightarrow z = 3$$

$$\frac{5}{3}y + \frac{4}{3}z = \frac{22}{3} \Rightarrow y = 2$$

$$3x + 2y + z = 10 \Rightarrow x = 1$$