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Topic: 3.5 – Gauss Jordan method

+) solve by Gauss-Jordan method :

$$5x_1 - x_2 = 9 \quad ; \quad -x_1 + 5x_2 - x_3 = 4 \quad ; \quad -x_2 + 5x_3 = -6$$

The given augmented matrix is

$$(A, B) = \left[\begin{array}{ccc|c} -1 & 5 & -1 & 4 \\ 5 & -1 & 0 & 9 \\ 0 & -1 & 5 & -6 \end{array} \right]$$

$$\sim \left[\begin{array}{ccc|c} 1 & -5 & 1 & -4 \\ 5 & -1 & 0 & 9 \\ 0 & -1 & 5 & -6 \end{array} \right] R_1 \rightarrow -R_1$$
$$\sim \left[\begin{array}{ccc|c} 1 & -5 & 1 & -4 \\ 0 & 24 & -5 & 29 \\ 0 & -1 & 5 & -6 \end{array} \right] R_2 \rightarrow R_2 - 5R_1$$



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$$\sim \left[\begin{array}{ccc|c} 1 & -5 & 1 & -4 \\ 0 & 1 & -\frac{5}{24} & \frac{29}{24} \\ 0 & -1 & 5 & -6 \end{array} \right] \quad R_2 \rightarrow \frac{R_2}{24}$$
$$\sim \left[\begin{array}{ccc|c} 1 & 0 & -\frac{1}{24} & \frac{49}{24} \\ 0 & 1 & -\frac{5}{24} & \frac{29}{24} \\ 0 & 0 & \frac{115}{24} & -\frac{115}{24} \end{array} \right] \quad \begin{array}{l} R_1 \rightarrow R_1 + 5R_2 \\ R_3 \rightarrow R_3 + R_2 \end{array}$$

$$\sim \left[\begin{array}{ccc|c} 1 & 0 & -\frac{1}{24} & \frac{49}{24} \\ 0 & 1 & -\frac{5}{24} & \frac{29}{24} \\ 0 & 0 & 1 & -1 \end{array} \right] \quad R_3 \rightarrow \frac{24}{115} R_3$$
$$\sim \left[\begin{array}{ccc|c} 1 & 0 & 0 & 2 \\ 0 & 1 & 0 & 1 \\ 0 & 0 & 1 & -1 \end{array} \right] \quad \begin{array}{l} R_1 \rightarrow R_1 + \frac{R_3}{24} \\ R_2 \rightarrow R_2 + \frac{5R_3}{24} \end{array}$$

$\therefore x_1 = 2 ; x_2 = 1 ; x_3 = -1$