Question 4: Gauss – Jordan method

$$\begin{bmatrix} 4x + 8y + 4z = 80 \\ 2x + 1y - 4z = 7 \\ 3x - 1y + 2z = 22 \end{bmatrix} \rightarrow \left[\begin{array}{ccc|c} 4 & 8 & 4 & 80 \\ 2 & 1 & -4 & 7 \\ 3 & -1 & 2 & 22 \end{array}\right]$$

$\rightarrow R_{12}$ $\left[\begin{array}{ccc|c} 2 & 1 & -4 & 7 \\ 4 & 8 & 4 & 80 \\ 3 & -1 & 2 & 22 \end{array}\right]$ $\rightarrow R_2 - 2R_1$ $\left[\begin{array}{ccc|c} 2 & 1 & -4 & 7 \\ 0 & 6 & 12 & 66 \\ 3 & -1 & 2 & 22 \end{array}\right]$

$\rightarrow 2R_3 - 3R_1$ $\left[\begin{array}{ccc|c} 2 & 1 & -4 & 7 \\ 0 & 6 & 12 & 66 \\ 0 & -5 & 16 & 23 \end{array}\right]$ $\rightarrow \frac{1}{6}R_2$ $\left[\begin{array}{ccc|c} 2 & 1 & -4 & 7 \\ 0 & 1 & 2 & 11 \\ 0 & -5 & 16 & 23 \end{array}\right]$

$\rightarrow R_1 - R_2$ $\left[\begin{array}{ccc|c} 2 & 0 & -6 & -4 \\ 0 & 1 & 2 & 11 \\ 0 & -5 & 16 & 23 \end{array}\right]$ $\rightarrow R_3 + 5R_2$ $\left[\begin{array}{ccc|c} 2 & 0 & -6 & -4 \\ 0 & 1 & 2 & 11 \\ 0 & 0 & 26 & 78 \end{array}\right]$

$\rightarrow \frac{1}{26}R_3$ $\left[\begin{array}{ccc|c} 2 & 0 & -6 & -4 \\ 0 & 1 & 2 & 11 \\ 0 & 0 & 1 & 3 \end{array}\right]$ $\rightarrow R_2 - 2R_3$ $\left[\begin{array}{ccc|c} 2 & 0 & -6 & -4 \\ 0 & 1 & 0 & 5 \\ 0 & 0 & 1 & 3 \end{array}\right]$

$\rightarrow \frac{1}{2}R_1$ $\left[\begin{array}{ccc|c} 1 & 0 & -3 & -2 \\ 0 & 1 & 0 & 5 \\ 0 & 0 & 1 & 3 \end{array}\right]$ $\rightarrow R_1 + 3R_3$ $\left[\begin{array}{ccc|c} 1 & 0 & 0 & 7 \\ 0 & 1 & 0 & 5 \\ 0 & 0 & 1 & 3 \end{array}\right]$

$$\Rightarrow x = 7; \quad y = 5; \quad z = 3$$