→ $\begin{bmatrix} 1 & 1 & 1 \\ 1 & 1 & 1 \\ 1 & 1 & 2 \end{bmatrix}$.

→

Q1 (C) $2x - 3y + z = -1$

$x + 4y - 3z = 0$

$3x - y + 4z = 13$

$\left[\begin{array}{ccc|c} 2 & -3 & 1 & -1 \\ 1 & 4 & -3 & 0 \\ 3 & -1 & 4 & 13 \end{array}\right]$ $R_2 \to R_2 - \frac{1}{2}R_1$, $R_3 \to R_3 - \frac{3}{2}R_1$

$\left[\begin{array}{ccc|c} 2 & -3 & 1 & -1 \\ 0 & \frac{11}{2} & -\frac{7}{2} & \frac{1}{2} \\ 0 & \frac{7}{2} & \frac{5}{2} & \frac{29}{2} \end{array}\right]$

$\left[\begin{array}{ccc|c} 2 & -3 & 1 & -1 \\ 0 & 11 & -7 & 1 \\ 0 & 7 & 5 & 29 \end{array}\right]$

$R_3 \to R_3 - \frac{7}{11}R_2$

$\left[\begin{array}{ccc|c} 2 & -3 & 1 & -1 \\ 0 & 11 & -7 & 1 \\ 0 & 0 & 104 & 312 \end{array}\right]$

$11y - 7z = 1$ $\quad 104z = 312$

$y = 2$ $\quad z = 3$.

$2x - 3y + z = -1$

$x = 1$

$-1 + \frac{3}{11} = -\frac{1}{11} - \frac{21}{11}$

$1 - \frac{3}{11} \times 7$

$R_1 \to R_1 + \frac{3}{11}R_2$

$\left[\begin{array}{ccc|c} 2 & 0 & -\frac{10}{11} & -\frac{8}{11} \end{array}\right]$

$$\left[\begin{array}{ccc|c} 2 & 0 & -\frac{10}{11} & -\frac{8}{11} \\ 0 & 11 & -7 & 1 \\ 0 & 0 & 11 & 3 \end{array}\right]$$

$-\frac{8}{11} + \frac{10}{11} \times 3$

$1+1$

$R_1 \rightarrow R_1 + \frac{10}{11} R_3$

$R_2 \rightarrow R_2 + 7R_3$

$$\left[\begin{array}{ccc|c} 2 & 0 & 0 & 2 \\ 0 & 11 & 0 & 22 \\ 0 & 0 & 1 & 3 \end{array}\right]$$

Q5 $x - 4y + z = 5$

$4x + 2y - z = 10$

$x + y - 4z = 0$

(3 iterations)

Gauss ~~Jordan~~ Jacobi, Seidal

$4x + 2y - z = 10$

$x - 4y + z = 5$

$x + y - 4z = 0$

$x^{n+1} = \frac{10 - 2y^n + z^n}{4}$

$(x^0, y^0, z^0) = (0,0,0)$

$y^{n+1} = -\frac{1}{4}(5 - x^n - z^n)$

$x^1 = 2.5$

$y^1 = -\frac{5}{4} = -1.25$

$z^{n+1} = \frac{1}{4}(x^n + y^n)$

$x^1 = 0$ $\quad x^2 = 10 - \frac{2(-1.25) + 0}{4} = 3.125$

$y^2 = \frac{-1}{4}(5 - 2.5 - 0) = -0.625$

$|x^1 - x^0| = 2.5$

$z^2 = \frac{1}{4}(2.5 - 1.25) = 0.3125$

$|x^2 - x^1| = |3.125 - 2.5| = 0.625$

$|x^3 - x^2| \quad x^3 = \frac{1}{4}(10 - 2(-0.625) + 0.3125)$

$|2.89062 - 3.125| = \frac{185}{64} = 2.89062$

$= 0.39$

$y^3 = \frac{-1}{4}(5 - 3.125 - 0.3125) =$

-0.39062

$z^3 = \frac{1}{4}(3.125 - 0.625) = 0.625$

---

(4) $\quad x - 4y + z = 5$

Gauss Seidal $\quad 4x + 2y - z = 10$

$x + y - 4z = 0$

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

$4x + 2y - z = 10$

$x - 4y + z = 5$

$x + y - 4z = 0$

$17x_1 + 65x_2 - 13x_3 + 50x_4 = 84$

$x^{n+1} = \frac{10 - 2y^n + z^n}{}$

$$x^{\cdots} = \frac{10 - 2y^n + z^n}{4}$$

$$x^{n+1} - 4y^{n+1} = 5 - z^n$$

$$x^{n+1} + y^{n+1} - 4z^{n+1} = 0$$

$n = 0$

$$x^1 = 2.5$$

$$x^1 - 4y^1 = 5 - 0 \Rightarrow$$

$$2.5 - 4y^1 = 5$$

$$y^1 = -0.625$$

$$x^1 - y^1 - 4z^1 = 0$$

$$2.5 - (-0.625) - 4z^1 = 0$$

$$z^1 = 0.469$$

LU decomposition (Crout's)

Q9

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

$$x + y + z = 6$$

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

$$\begin{bmatrix} 2 & -1 & 1 \\ 1 & 1 & 1 \\ 3 & 1 & -1 \end{bmatrix} = \begin{bmatrix} l_{11} & 0 & 0 \\ l_{21} & l_{22} & 0 \\ l_{31} & l_{32} & l_{33} \end{bmatrix} \begin{bmatrix} 1 & u_{12} & u_{13} \\ 0 & 1 & u_{23} \\ 0 & 0 & 1 \end{bmatrix}$$

$$l_{11} = 2 \qquad l_{11} u_{12} = -1 \Rightarrow u_{12} = -\tfrac{1}{2}$$

$$l_{11} u_{13} = 1 \Rightarrow u_{13} = \tfrac{1}{2}, \quad l_{21} = 1,$$

$$l_{21} u_{12} + l_{22} = 1 \Rightarrow -\tfrac{1}{2} + l_{22} = 1 \Rightarrow l_{22} = \tfrac{3}{2}$$

$l_{21}u_{13} + l_{22}u_{23} = 1 \Rightarrow 1\left(\frac{1}{2}\right) + \frac{3}{2}u_{23} = 1$

$u_{23} = \frac{1}{3}$

$l_{31} = 3$

$l_{31}u_{12} + l_{32} = 1 \Rightarrow 3 \times \frac{-1}{2} + l_{32} = 1$

$l_{32} = \frac{5}{2}$

$l_{31}u_{13} + l_{32} * u_{23} + l_{33} = -1$

$3\left(\frac{1}{2}\right) + \frac{5}{2}\left(\frac{1}{3}\right) + l_{33} = -1$

$l_{33} = -10/3$