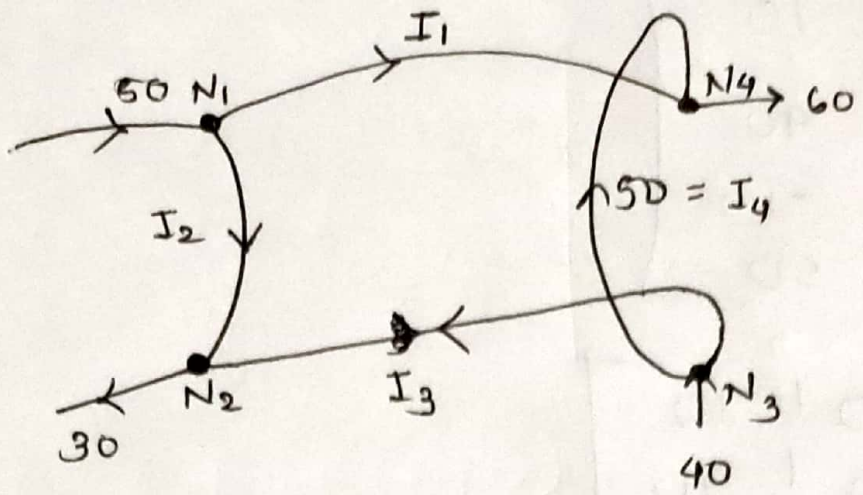

$$50 = I_1 + I_2$$
$$I_2 = 30 + I_3$$
$$40 = I_3 + 50$$
$$60 = I_1 + 50$$

$$50 = I_1 + I_2$$
$$30 = I_2 + I_3$$
$$40 = I_3 + 50$$
$$60 = I_1 + 50$$

Solve :-

$I_1 = 60 - 50$

$\boxed{I_1 = 10}$

$I_3 = 40 - 50$

$\boxed{I_3 = -10}$

$30 = I_2 + I_3$

$30 = I_2 + (-10)$

$I_2 = 30 + 10$

$\boxed{I_2 = 40}$

$\boxed{I_4 = 50}$

Matrix $AX = B$

$$\begin{bmatrix} 1 & 1 & 0 & 0 \\ 0 & 1 & 1 & 0 \\ 0 & 0 & 1 & 1 \\ 1 & 0 & 0 & 1 \end{bmatrix} \begin{bmatrix} 10 \\ 40 \\ -10 \\ 50 \end{bmatrix} = \begin{bmatrix} 50 \\ 30 \\ 40 \\ 60 \end{bmatrix}$$

Norms of unknown variable i.e., $[10 \quad 40 \quad -10 \quad 50]$

① Euclidean Norm (L^2 Norm)

$$\|X\|_2 = (10^2 + 40^2 + (-10)^2 + 50^2)^{1/2}$$
$$= (100 + 1600 + 100 + 2500)^{1/2}$$
$$= (4300)^{1/2}$$
$$\|X\|_2 \approx 65.57$$

② 1- Norms

$$||X||_1 = |10| + |40| + |-10| + |50|$$

$$= 10 + 40 + 10 + 50$$

$$||X||_1 = 110$$

③ Infinity Norm

$$||X||_\infty = \max(|x_1|, |x_2|, |x_3|, |x_4|)$$

$$= \max(|10|, |40|, |-10|, |50|)$$

$$= 50$$

Rank of A & A|B

$$A|B = \left[\begin{array}{cccc:c} 1 & 1 & 0 & 0 & 50 \\ 0 & 1 & 1 & 0 & 30 \\ 0 & 0 & 1 & 1 & 40 \\ 1 & 0 & 0 & 1 & 60 \end{array}\right] \begin{array}{l} \rightarrow R_1 \\ \rightarrow R_2 \\ \rightarrow R_3 \\ \rightarrow R_4 \end{array}$$

$R_4 - R_1$

$$A|B = \left[\begin{array}{cccc:c} 1 & 1 & 0 & 0 & 50 \\ 0 & 1 & 1 & 0 & 30 \\ 0 & 0 & 1 & 1 & 40 \\ 0 & -1 & 0 & 1 & 10 \end{array}\right]$$

$R_2 + R_4$

$$A|B = \left[\begin{array}{cccc:c} 1 & 1 & 0 & 0 & 50 \\ 0 & 1 & 1 & 0 & 30 \\ 0 & 0 & 1 & 1 & 40 \\ 0 & 0 & 1 & 1 & 40 \end{array}\right]$$

$R_4 - R_3$

$$\left[\begin{array}{cccc|c} 1 & 1 & 0 & 0 & 50 \\ 0 & 1 & 1 & 0 & 30 \\ 0 & 0 & 1 & 1 & 40 \\ 0 & 0 & 0 & 0 & 0 \end{array}\right]$$

$\therefore$ Rank (A) = Rank (A|B) = 3

as Rank (A) = Rank (A|B) < n $\quad$ $\boxed{\because n = 4}$

$\therefore$ Infinitly many solutions.

Rank Nullity = No of columns - Rank (A)

= 4 - 3

= 1