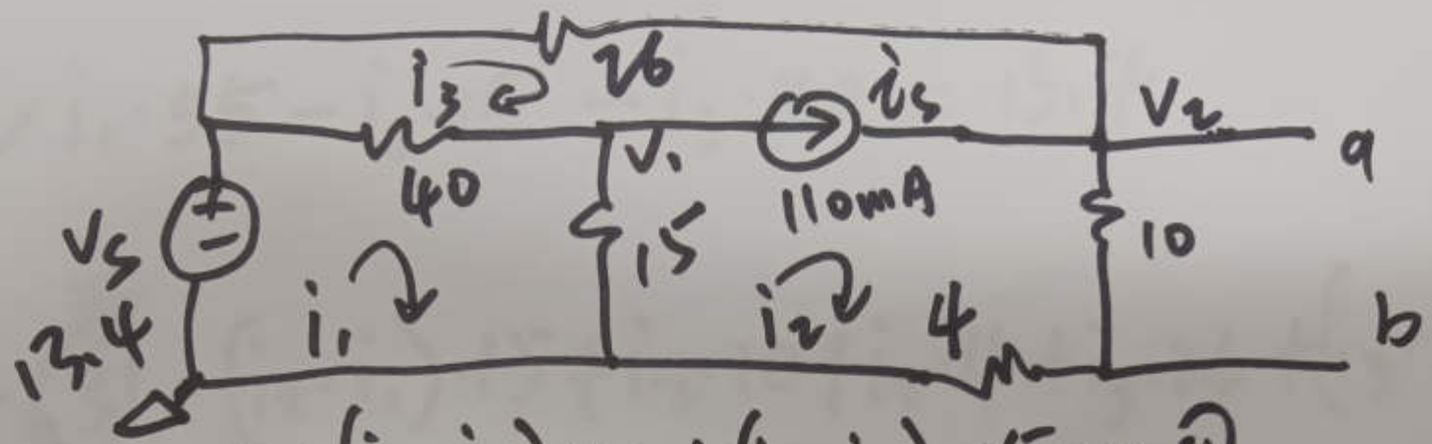


$$-13.4 + (i_1 - i_3)\cdot 40 + (i_1 - i_2)\cdot 15 = 0 \quad (1)$$

$$(i_2 - i_1)\cdot 15 + (V_1 - V_2) + i_2 \cdot 10 + i_2 \cdot 4 = 0 \quad (2)$$

$$i_3 \cdot 26 + (V_2 - V_1) + (i_3 - i_1)\cdot 40 = 0 \quad (3)$$

$$i_2 - i_3 = 110 \cdot 10^{-3}$$

$$\frac{V_1}{15} = i_1 - i_2, \qquad \frac{V_2}{14} = i_2$$

$$V_1 = 15(i_1 - i_2) \qquad V_2 = 14 \cdot i_2$$

(1)

from ① ✓ $i_1 \cdot 55 - i_2 \cdot 15 - i_3 \cdot 40 = 13.4$

② + ③ $(i_2 - i_1) \cdot 15 + i_2 \cdot 10 + i_2 \cdot 4 + i_3 \cdot 26 + (i_3 - i_2) \cdot 40 = 0$

✓ $-i_1 \cdot 55 + i_2 \cdot 29 + i_3 \cdot 66 = 0$

✓ $i_1 \cdot 0 + i_2 \cdot 1 - i_3 \cdot 1 = 110 \times 10^{-3}$

$$A = \begin{bmatrix} 55 & -15 & -40 \\ -55 & 29 & 66 \\ 0 & 1 & -1 \end{bmatrix} \qquad b = \begin{bmatrix} 13.4 \\ 0 \\ 110 \times 10^{-3} \end{bmatrix}$$

$$X = \begin{bmatrix} i_1 \\ i_2 \\ i_3 \end{bmatrix} = \begin{bmatrix} 0.57 \\ 0.142 \\ 0.70 \end{bmatrix} \qquad \underline{A}\,\underline{x} = \underline{b}$$

$$A^{-1} A x = A^{-1} b$$

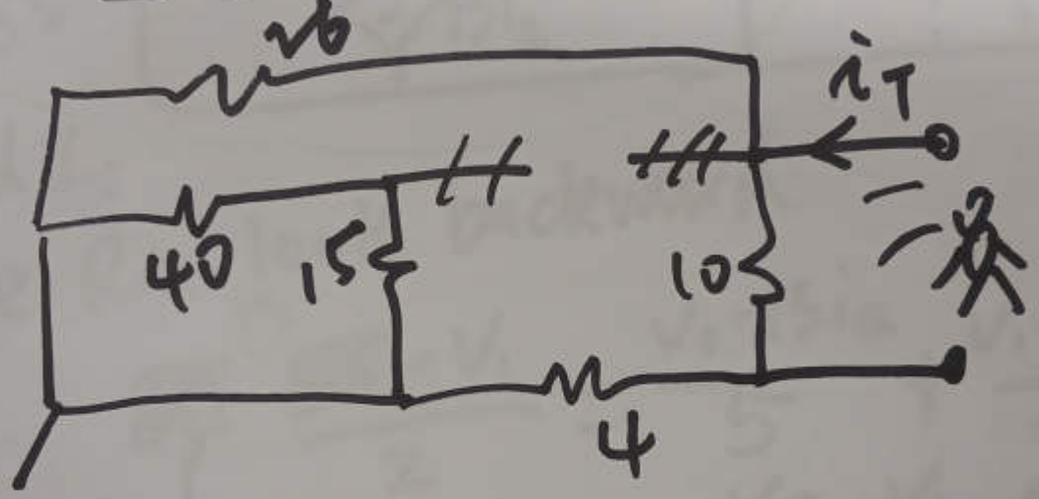
$$\begin{bmatrix} 1 & & \\ & 1 & \\ & & 1 \end{bmatrix} x = A^{-1} b$$

② ③

$V_2 = V_{TH} = i_2 \cdot 14\Omega = 0.41 \cdot 14\Omega$

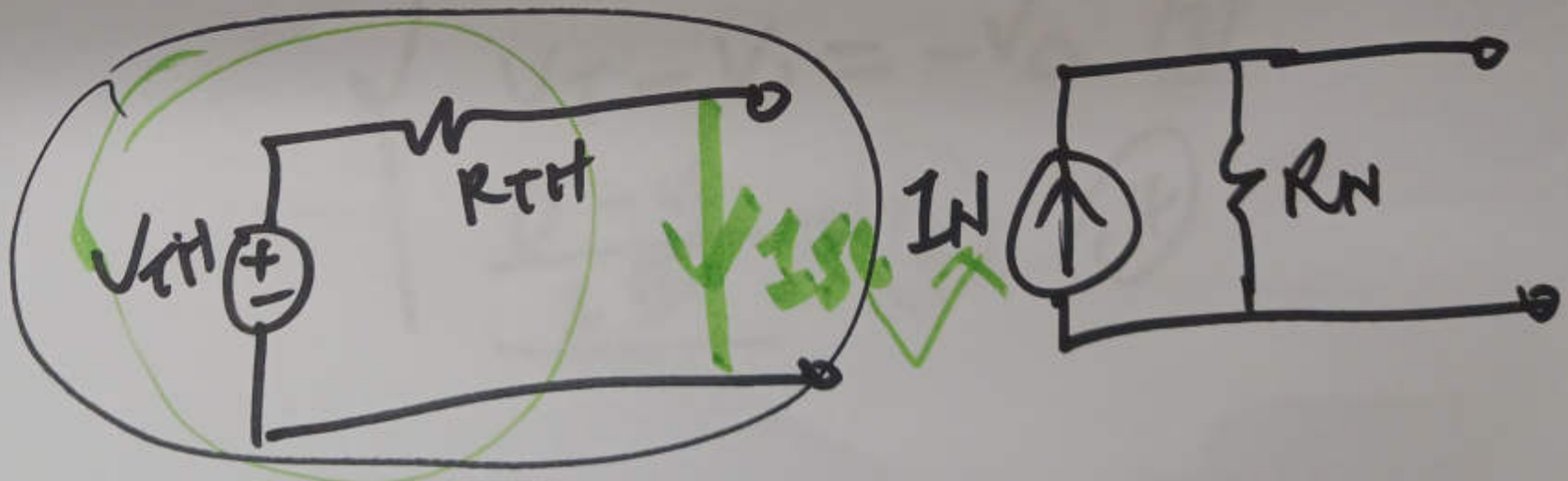
$= 5.75\,V$

R_{TH}:

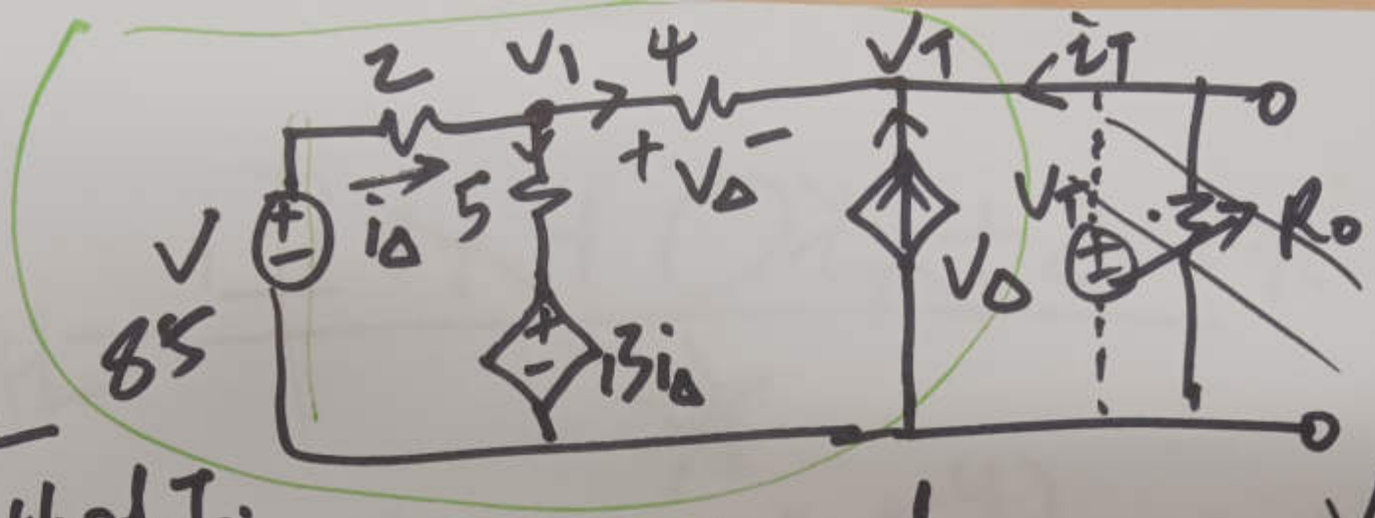


$R_{TH} = 26 \,||\, 14$

$I_N = \frac{V_{TH}}{R_{TH}}$



(3)



R_{TH}

Method I:

Remove R_o, look backward

$$\frac{V_T}{i_T} = R_{TH}$$

$$\frac{85 - V_1}{2} = \frac{V_1 - 13 i_o}{5} + \frac{V_1 - V_T}{4} \quad (1)$$

$$V_o + i_T = \frac{V_T - V_1}{4} \quad (2)$$

$$V_T - V_1 = -V_o \quad (3)$$

$$\frac{0 - V_1}{2} = i_o \quad (4)$$

$$R_{TH} = \frac{\square i_T + \bigcirc i_T + \triangle i_T = \ast \frac{V_T}{i_T}}{\star}$$

④ → ① $\quad \frac{-V_1}{2} = \frac{V_1 - 13 \cdot \left(\frac{-V_1}{2}\right)}{5} + \frac{V_1 - V_T}{4}$

$$-10V_1 = 4V_1 + 26V_1 + 5V_1 - 5V_T$$

$$-45V_1 = -5V_T$$

$$9V_1 = V_T \quad ⑤ \Rightarrow V_1 = \frac{V_T}{9}$$

② and ③ $\Rightarrow \quad V_1 - V_T + i_T = \frac{V_T - V_1}{4}$

$$4V_1 - 4V_T + 4i_T = V_T - V_1$$

$$5V_1 = 5V_T - 4i_T \quad ⑥$$

⑤

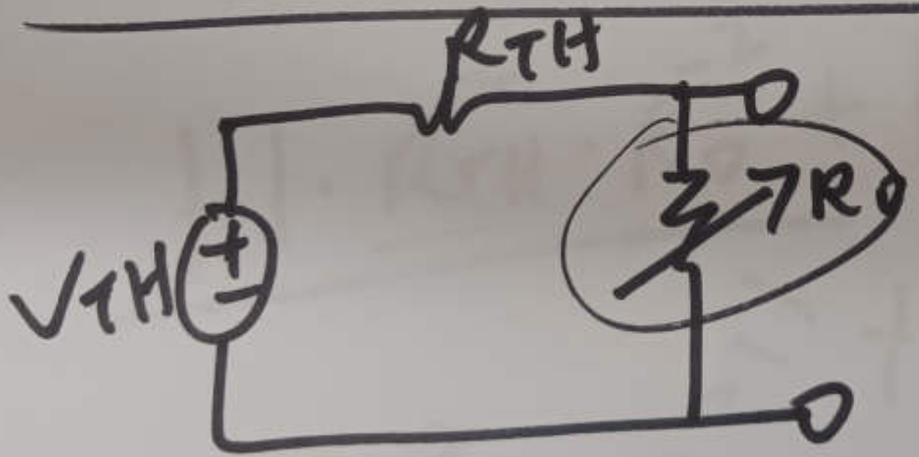
⑤ and ⑥ →

$$\frac{5}{9}V_T = 5V_T - 4i_T$$

$$5V_T = 45V_T - 36i_T$$

$$40V_T = 36i_T$$

$$\frac{V_T}{i_T} =$$



$$P_{max\,R_O} = \left(\frac{V}{R_{TH}+R_O}\right)^2 \cdot R_O$$

when $R_O = R_{TH}$

$$= \frac{V^2 \cdot R_O}{R_{TH} + R_O^2 + 2R_{TH} \cdot R_O}$$

$$= \frac{U^2}{\frac{R_{TH}^2}{R_0} + R_0 + 2R_{TH}}$$

$$\frac{d\left(\frac{R_{TH}^2}{R_0} + R_0\right)}{dR_0} = 0$$

$$+1 \cdot \tilde{R}_{TH} \cdot \tilde{R}_0^{-2} + 1 = 0$$

$$\tilde{z} = +1$$

$$\tilde{R}_{TH} = \tilde{R}_0$$

$$R_{TH} = R_0$$

(b)