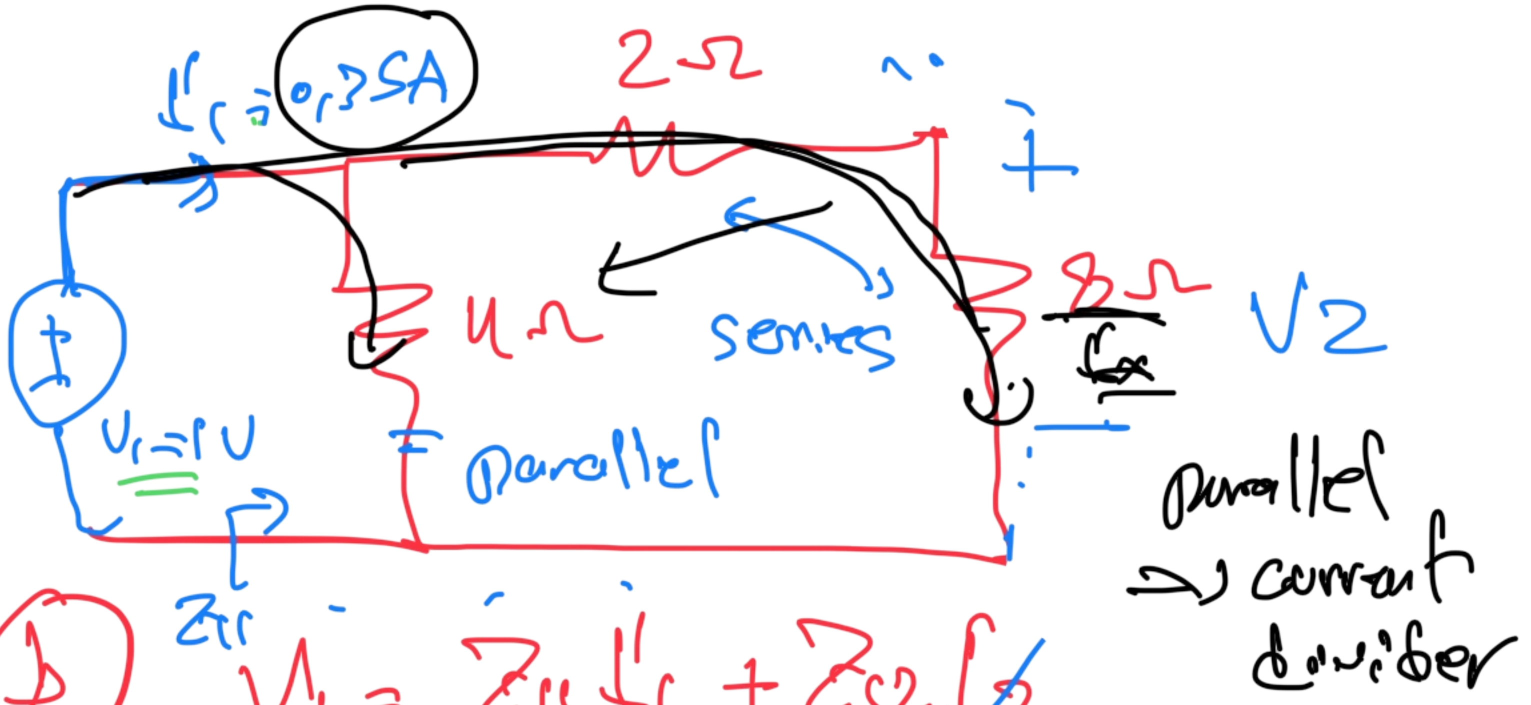
Find Z parameter



①

$$V_1 = Z_{11} I_1 + Z_{12} I_2$$

$$V_2 = Z_{21} I_1 + Z_{22} I_2$$

$I_2 = 0$ open

$$Z_{11} = \frac{V_1}{I_1} , \quad Z_{21} = \frac{V_2}{I_1}$$

$$Z_{11} = \frac{1}{\frac{1}{4} + \frac{1}{2+8}} = \frac{20}{7}\Omega$$

$$Z_{11} = \frac{20}{7}$$

$$I_1 = \frac{V}{Z} = \frac{1}{\frac{20}{7}}$$

$$\boxed{I_1 = 0,35A}$$

$$I_x = \frac{4}{4+2+8} * 0,35 = 0,1\,A$$

$$V_2 = 8 \times 0,1 = 0,8\,V$$

$$Z_{11} = \frac{20}{7}\,\Omega, \qquad Z_{21} = \frac{0,8}{0,35} = \frac{16}{7}\,\Omega$$

$$V_1 = I_1 Z_{11} + I_2 Z_{12}$$

$$V_2 = I_1 Z_{21} + I_2 Z_{22}$$

$I_1 = 0$ open

$$Z_{12} = \frac{V_1}{I_2}, \qquad Z_{22} = \frac{V_2}{I_2}$$

$$Z_{22} = \frac{1}{\frac{1}{8}+\frac{1}{4+2}} = \frac{24}{7}\,\Omega$$

$$I_2 = \frac{V_2}{Z_{22}} = \frac{1}{24/7} = \frac{7}{24}\,A \quad \checkmark$$

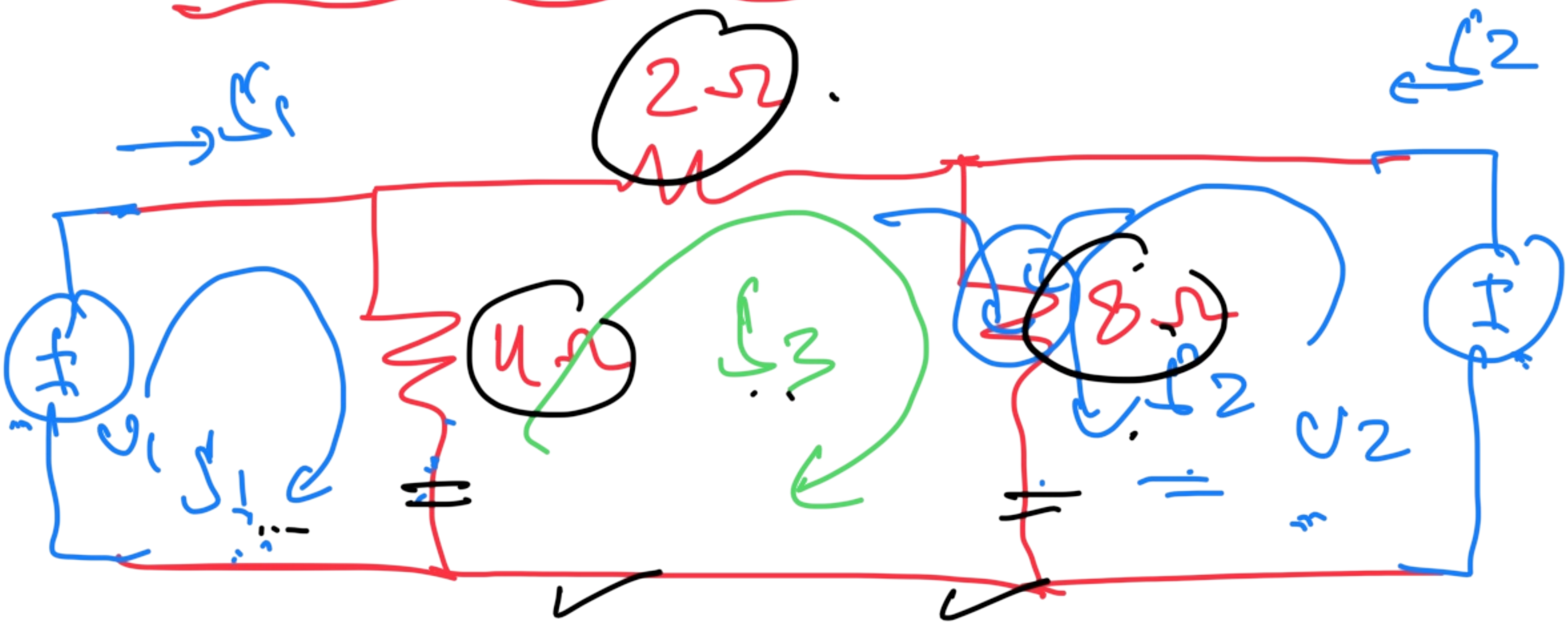
$$I_y = \frac{8}{8+2+4} \times 7/24 = \frac{1}{6}$$

$$V_1 = 4 \times \frac{1}{6} = \frac{2}{3}\,V$$

$$Z_{12} = \frac{2/3}{7/24} = 16/7$$

$$Z = \begin{bmatrix} \frac{20}{7} & 16/7 \\ 16/7 & 24/7 \end{bmatrix} \Omega$$

Find Z parameter



$$\left[\begin{aligned} V_1 &= Z_{11} I_1 + Z_{12} I_2 \\ V_2 &= Z_{21} I_1 + Z_{22} I_2 \end{aligned}\right\} \rightarrow Z \rightarrow \underset{\text{mesh}}{V}$$

mesh ① $4I_1 + 0I_2 - 4I_3 = V_1$

mesh ② $0I_1 + 8I_2 + 8I_3 = V_2$

mesh ③ $-4I_1 + 8I_2 + 14I_3 = 0$

$$\boxed{I_3 = \frac{4I_1}{14} - \frac{8I_2}{14}}$$

→ رح نعوضها
في 1و2

$$v_1 = 4 i_1 - \frac{4 \times 4 i_1}{14} + \frac{4 \times 8 i_2}{14}$$

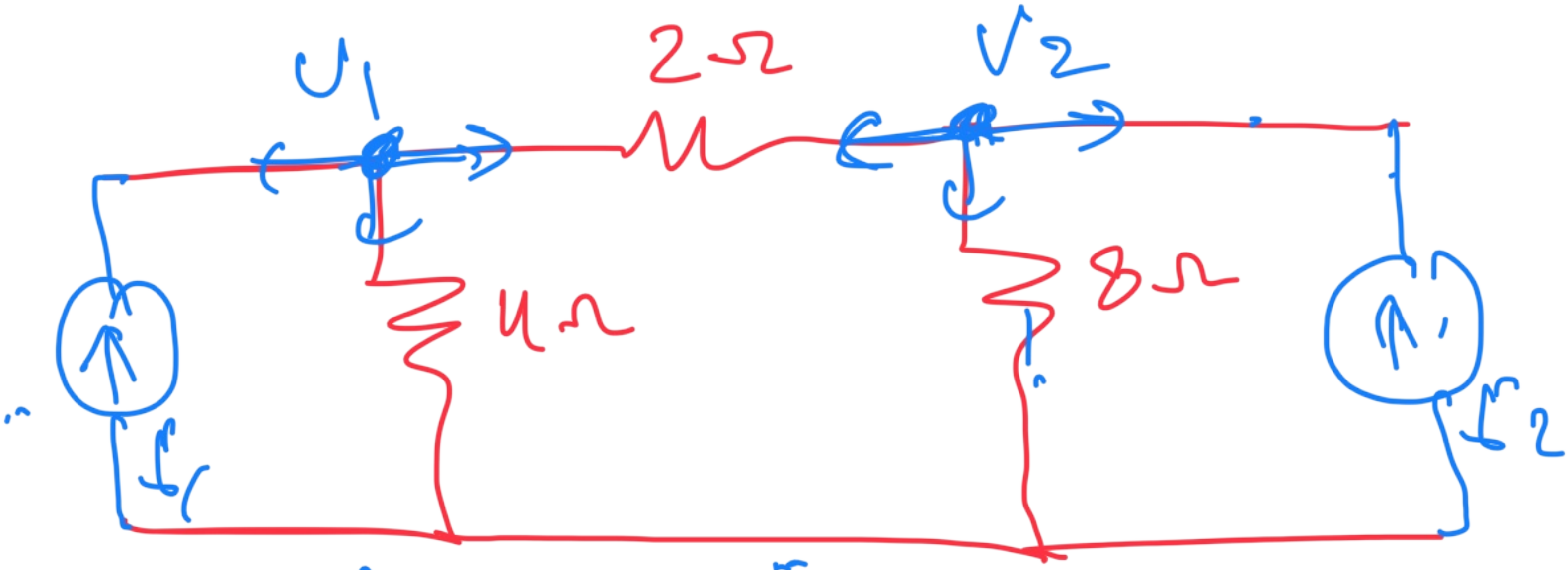
$$\boxed{v_1 = \frac{20}{7} i_1 + \frac{16}{7} i_2}$$

$$v_2 = 8 i_2 + \frac{8 \times 4 i_1}{14} - \frac{8 \times 8 i_2}{14}$$

$$\boxed{v_2 = \frac{16}{7} i_1 + \frac{24}{7} i_2}$$

$$Z = \begin{bmatrix} \frac{20}{7} & \frac{16}{7} \\ \frac{16}{7} & 24/7 \end{bmatrix} \Omega$$

Find Z parameter



$$\left.\begin{aligned} I_1 &= y_{11} V_1 + y_{12} V_2 \\ I_2 &= \underline{y_{21}} V_1 + \underline{y_{22}} V_2 \end{aligned}\right] \rightarrow y \rightarrow I$$

Node

node ① $-I_1 + \frac{V_1}{4} + \frac{V_1 - V_2}{2} = 0$

$$\Rightarrow \boxed{I_1 = \frac{3}{4} V_1 - \frac{1}{2} V_2} \rightarrow ①$$

node ② $\underline{-I_2} + \frac{V_2}{8} + \frac{V_2 - V_1}{2} = 0$

$$\boxed{I_2 = \frac{-1}{2} V_1 + \frac{5}{8} V_2} \rightarrow ②$$

$$y = \begin{bmatrix} \frac{3}{4} = 0,75 & \frac{-1}{2} = -0,5 \\ \frac{-1}{2} = -0,5 & \frac{5}{8} = 0,625 \end{bmatrix}_{2\times 2}$$

$Z = y^{-1}$ or $y = Z^{-1}$

mode → 6 → 1 → 5

shift → RCL → A → $\boxed{AC}$

shift → 4 → 3 → mode : [illegible]

x^{-1} → =

MatA

$$\begin{bmatrix} \frac{20}{7} & \frac{16}{7} \\ \frac{16}{7} & \frac{24}{7} \end{bmatrix} \Omega$$

20,7

[illegible] [illegible] □