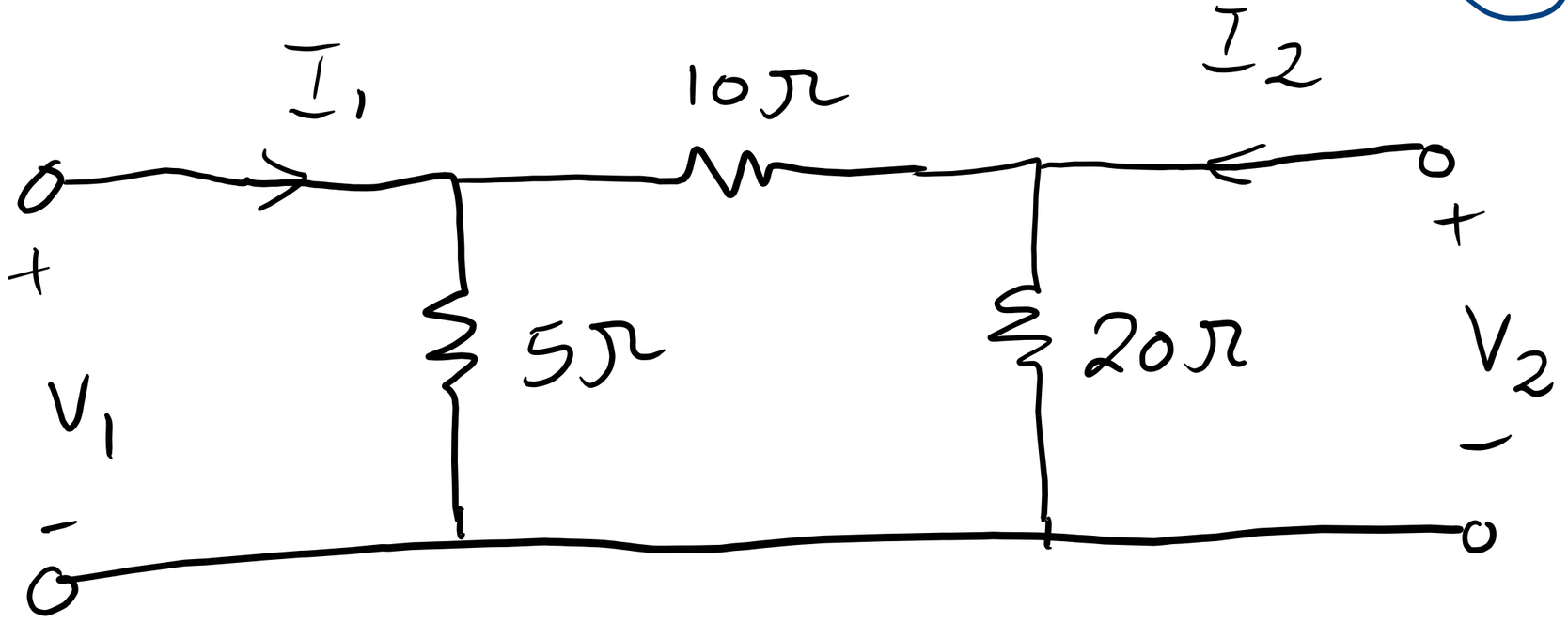
Example:



Find y-parameter

$$I_1 = y_{11} V_1 + y_{12} V_2$$

$$I_2 = y_{21} V_1 + y_{22} V_2$$

$$y_{11} = \left.\frac{I_1}{V_1}\right|_{V_2=0}$$

$$y_{12} = \left.\frac{I_1}{V_2}\right|_{V_1=0}$$

$$y_{21} = \left.\frac{I_2}{V_1}\right|_{V_2=0}$$

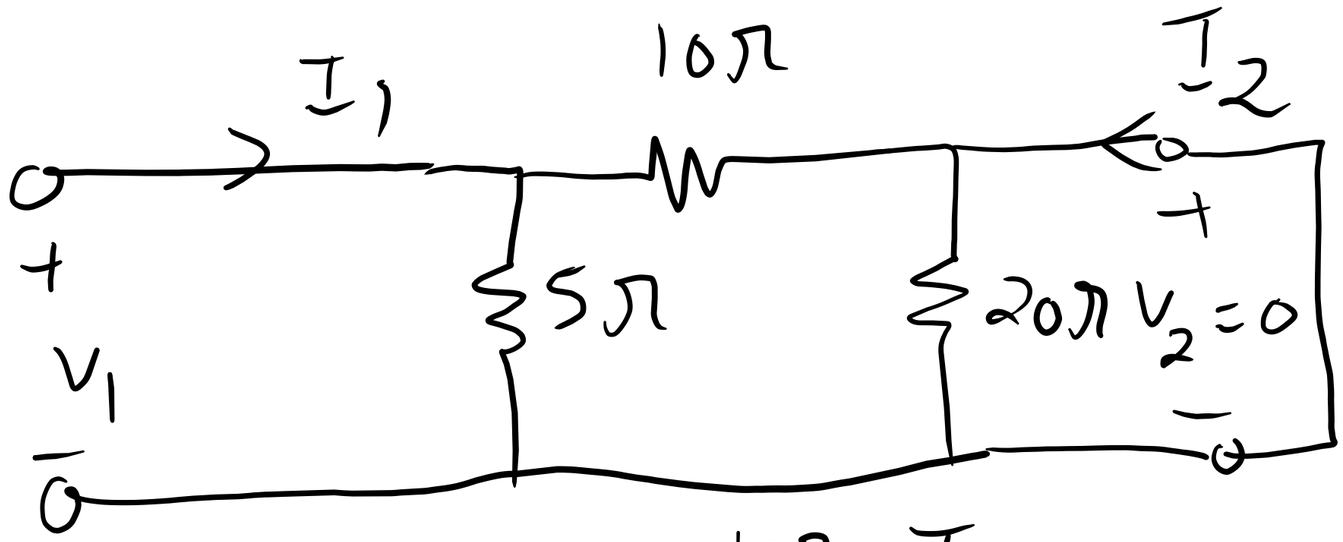
$$y_{22} = \left.\frac{I_2}{V_2}\right|_{V_1=0}$$

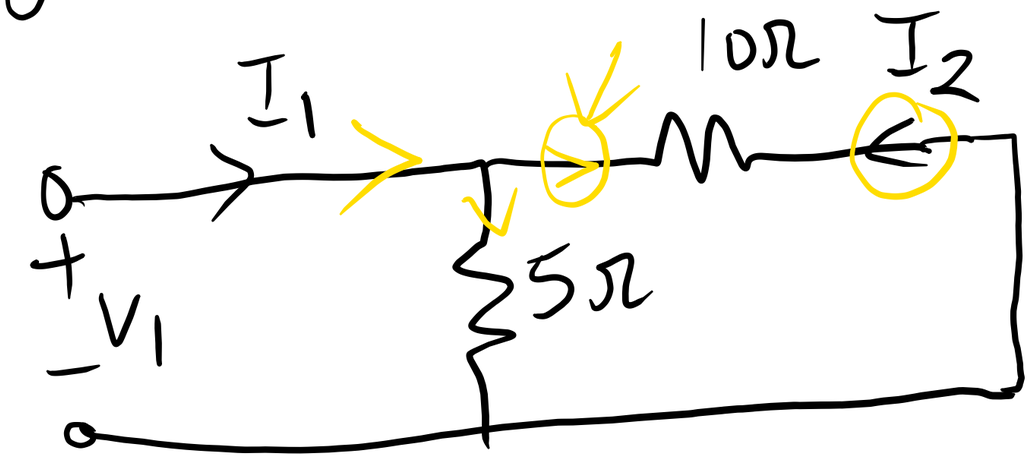
Post ① Short

post ② short

① Short circuit port ② ($V_2 = 0$)

ohm
[mho] [Ω^{-1}]





$$\frac{I_1}{V_1} = \frac{\cancel{15}\ 3}{\cancel{50}\ 10} = 0.3\,[S]$$

$$\frac{V_1}{I_1} = \frac{5 \times 10}{5 + 10}$$

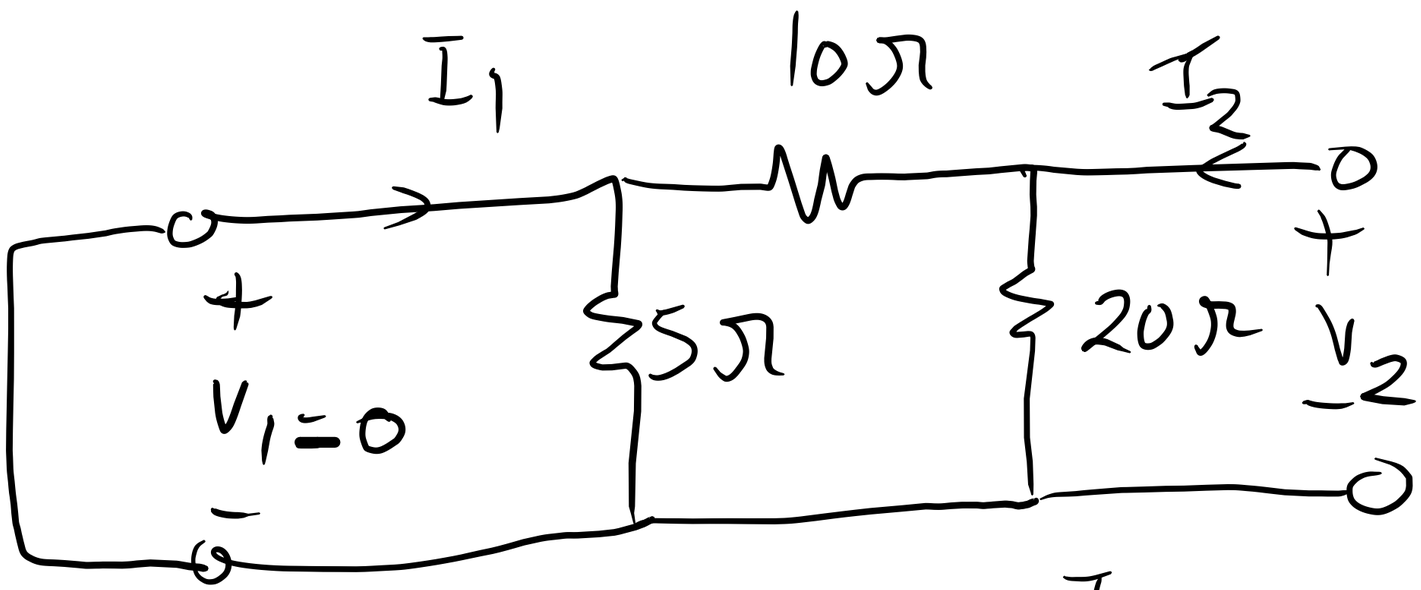
$$y_{11} = 0.3\,S$$

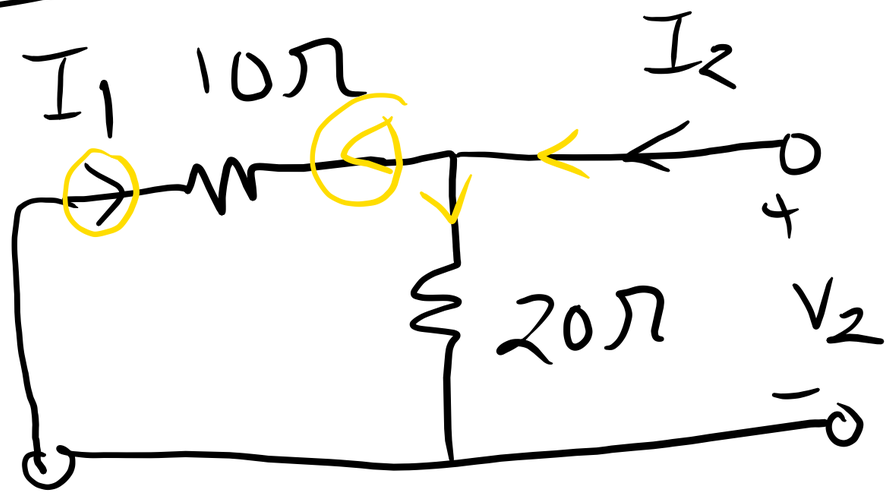
$$I_2 = -\frac{5}{5+10} I_1 = -\frac{\cancel{5}^{1}}{\cancel{15}_{3}} \times \cancel{0.3}^{0.1} V_1$$

$$I_2 = -0.1 V_1$$

$$\therefore \frac{I_2}{V_1} = -0.1 \Bigg\} y_{21} = -0.1 S$$

(11) short circuit port (1)





$$\frac{I_2}{V_2} = \frac{3}{20} = 0.15\,S$$

$$y_{22} = 0.15\,S$$

$$\frac{V_2}{I_2} = \frac{10 \times 20}{10 + 20} = \frac{200}{30}$$

$$I_1 = -\frac{20}{10+20} I_2 = \frac{-20}{30} \times 0.15 V_2$$

$$= -0.1 V_2$$

$$\frac{I_1}{V_2} = -0.1S$$

$$y_{12} = -0.1S$$

$$\begin{bmatrix} y_{11} & y_{12} \\ y_{21} & y_{22} \end{bmatrix}$$

$$I_1 = y_{11} V_1 + y_{12} V_2$$

$$I_2 = y_{21} V_1 + y_{22} V_2$$

$$y_{12} = y_{21}$$

$$I_1 = 0.3 V_1 - 0.1 V_2$$

$$I_2 = -0.1 V_1 + 0.15 V_2$$

$$\begin{bmatrix} I_1 \\ I_2 \end{bmatrix} = \begin{bmatrix} 0.3 & -0.1 \\ -0.1 & 0.15 \end{bmatrix} \begin{bmatrix} V_1 \\ V_2 \end{bmatrix}$$