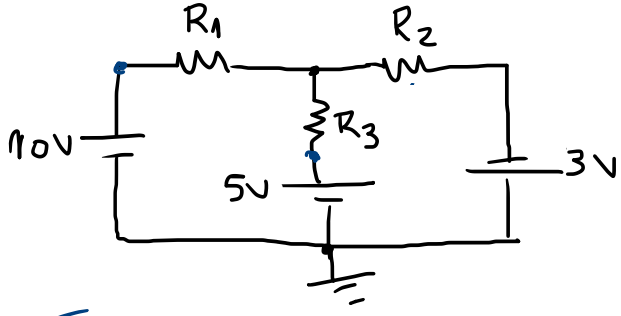
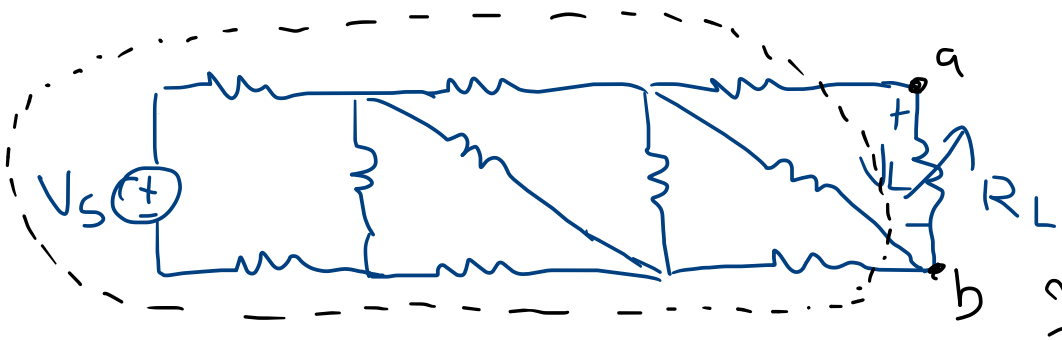
→ Transformação de fontes

→ Análise nodal

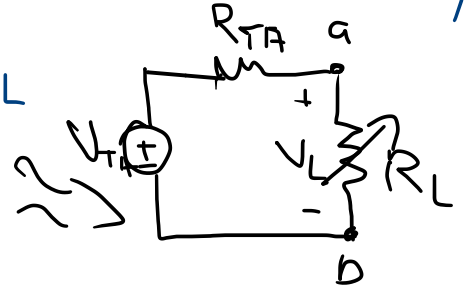
→ Análise de laço




## → Teorema de Thevenin

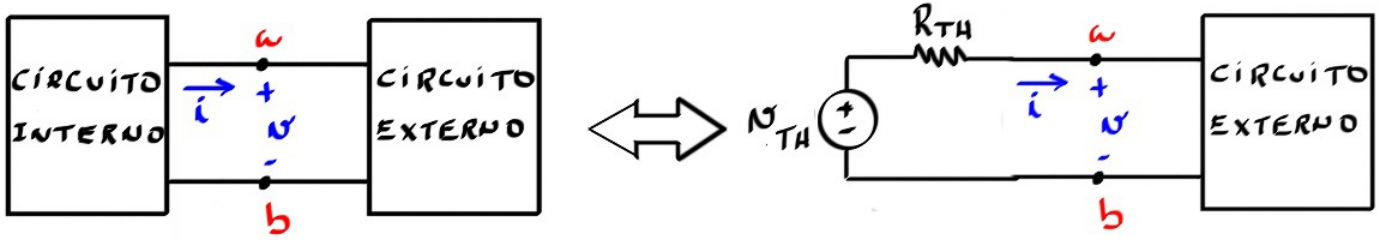



$R_L = (1K - 10K)$

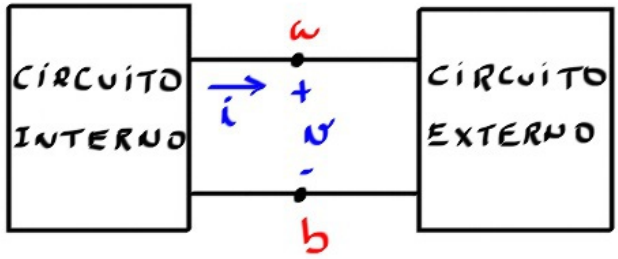


# Circuitos Lineares

## TEOREMA DE THEVENÍN

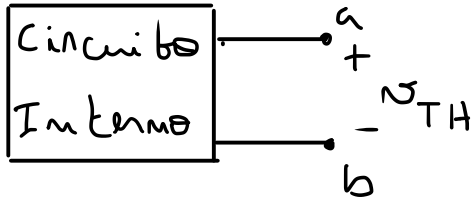



$$v_{TH} = v + R_{TH} \cdot i$$

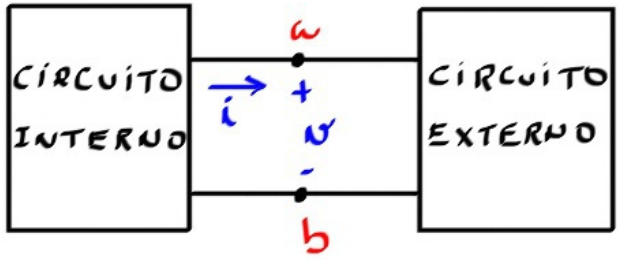



$$v_{TH} = v + R_{TH} \cdot i$$

→ Para $i = 0$:



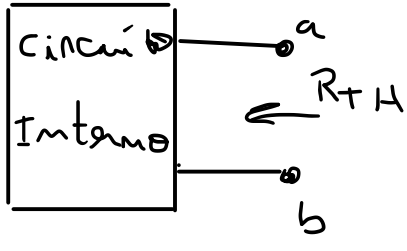

→ Tensão de circuito aberto entre os pontos a - b no circuito original.




$$v_{TH} = v + R_{TH} \cdot i$$

→ Para $v_{TH} = 0$:

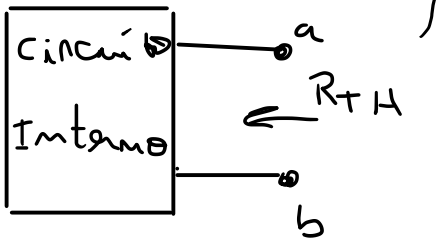
$$R_{TH} = -\frac{v}{i}$$




→ Resistência equivalente entre os pontos a e b, para dentro do circuito interno, considerando-se todas as fontes independentes em repouso.

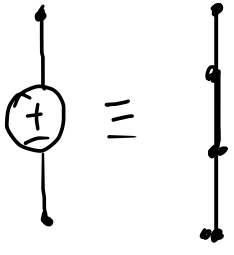
→ Para $v_{TH} = 0$:

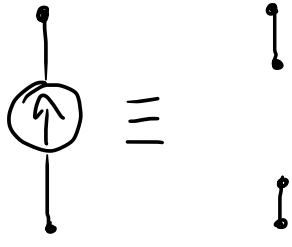
$$R_{TH} = -\frac{v}{i}$$

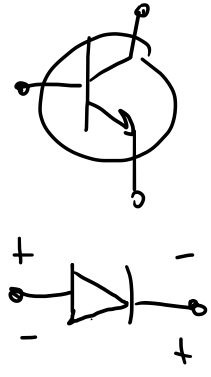



→ Resistência equivalente entre os pontos a e b, para dentro do circuito interno, considerando-se todas as fontes <u>independentes</u> em repouso

Fontes independentes em repouso:

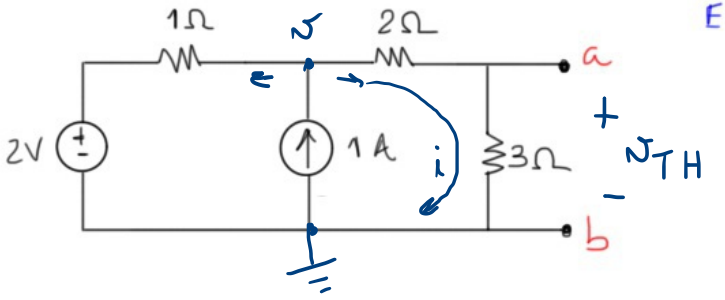




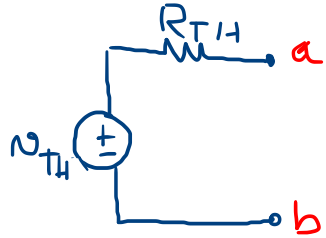


# EXERCÍCIO 01

MODELO EQUIVALENTE DE THEVENIN ENTRE OS PONTOS a e b




MODELO EQUIVALENTE:




→ CÁLCULO DE $v_{TH}$:

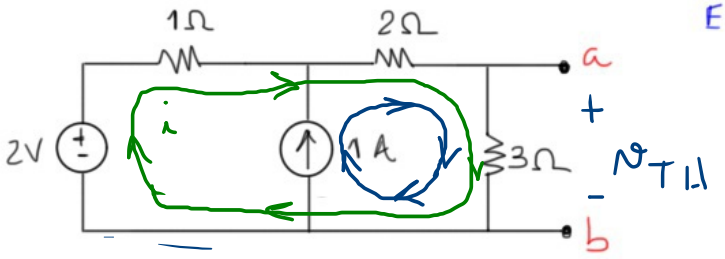
$$\frac{v-2}{1} + \frac{v}{5} = 1$$

$$v = \frac{5}{2} V$$

$$v_{TH} = 3.i = 3.\frac{v}{2+3} \Rightarrow \boxed{v_{TH} = \frac{3}{2} V}$$

# EXERCÍCIO 01

MODELO EQUIVALENTE DE THEVENIN ENTRE OS PONTOS a e b




→ CÁLCULO DE $v_{TH}$: (Por laço)

$$1.i + 2.(i+1) + 3(i+1) = 2$$

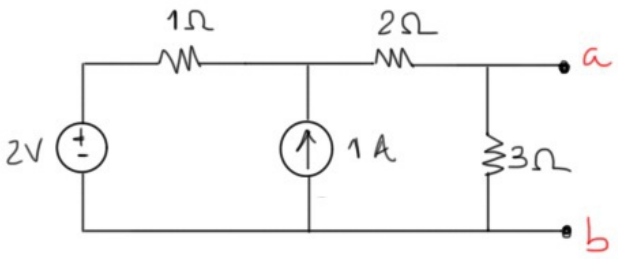
$$i = -\frac{1}{2}A$$

$$v_{TH} = 3.(i+1) = 3.\left(-\frac{1}{2}+1\right)$$

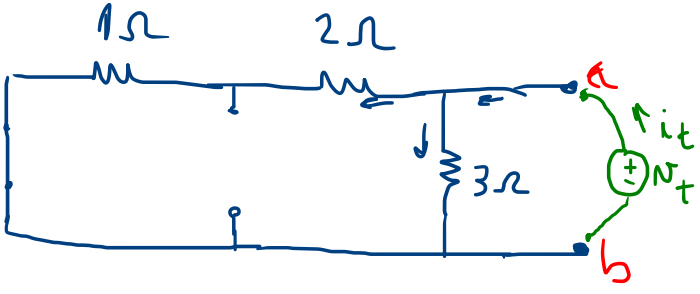
$$\boxed{v_{TH} = \frac{3}{2}V}$$

# EXERCÍCIO 01

MODELO EQUIVALENTE DE THEVENIN ENTRE OS PONTOS a e b




→ CÁLCULO DE $R_{TH}$:

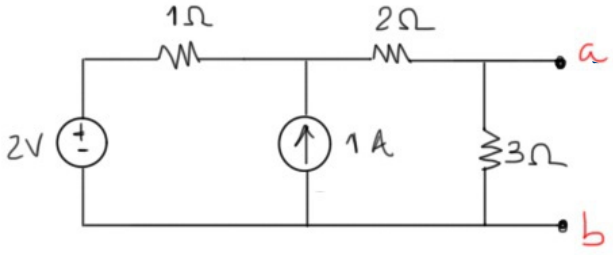



$$R_{TH} = (1+2) \,||\, 3$$

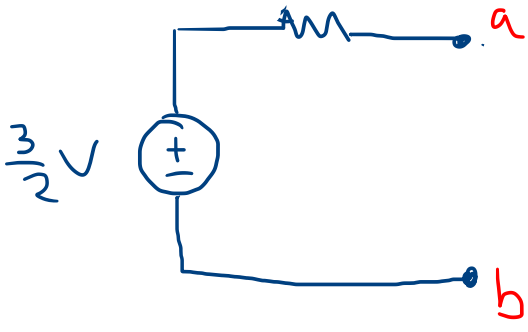
$$R_{TH} = \frac{3}{2}\,\Omega$$

# EXERCÍCIO 01

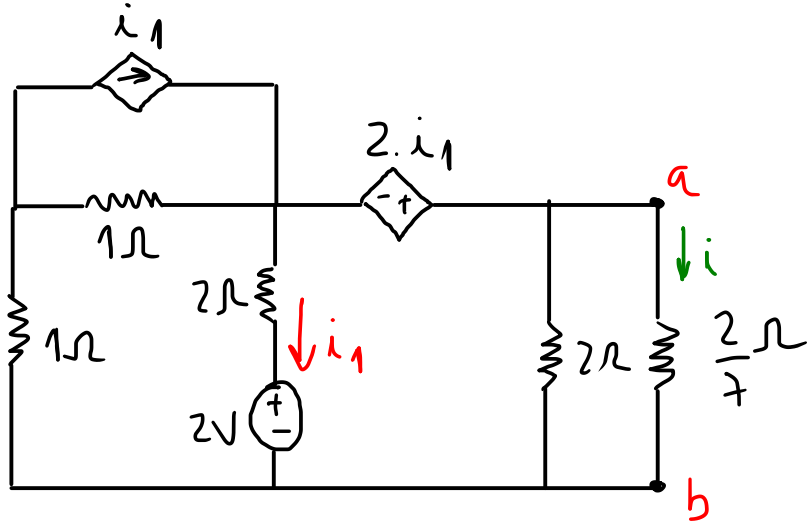
MODELO EQUIVALENTE DE THEVENIN ENTRE OS PONTOS a e b



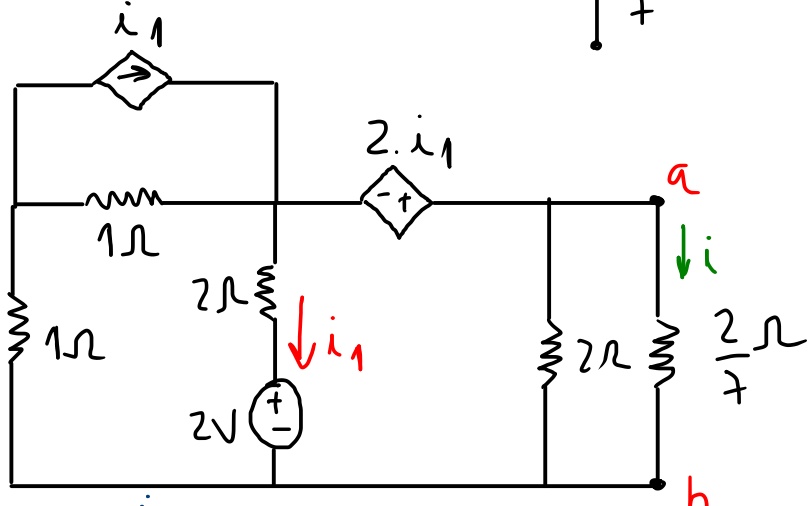

→ Finalmente:

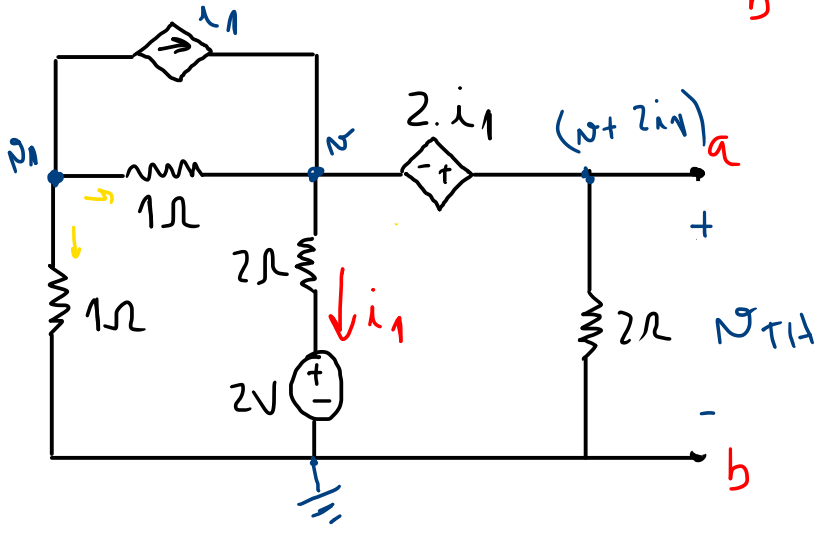


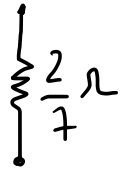
# EXERCÍCIO 02



# EXERCÍCIO 02




CÁLCULO DE $V_{TH}$:

$v$:

$$\frac{v - v_1}{1} + \frac{v - 2}{2} + \frac{v + 2i_1}{2} = i_1 \quad (i)$$

$v_1$:

$$\frac{v_1}{1} + \frac{v_1 - v}{1} = -i_1 \quad (ii)$$

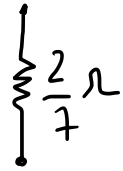
Mas: $i_1 = \frac{v - 2}{2}$ (iii)

$v = \frac{6}{7}V$ ; $v_1 = \frac{5}{7}V$

$V_{TH}$: $V_{TH} = v + 2i_1$

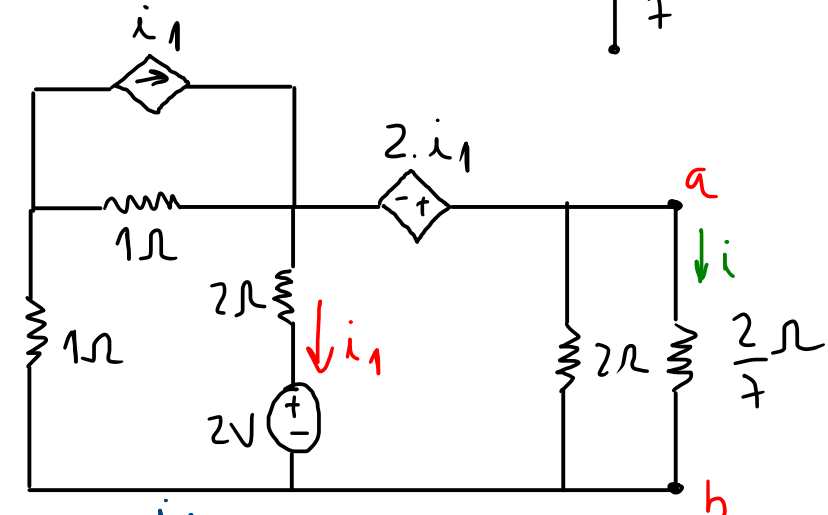
$$V_{TH} = -\frac{2}{7}V$$

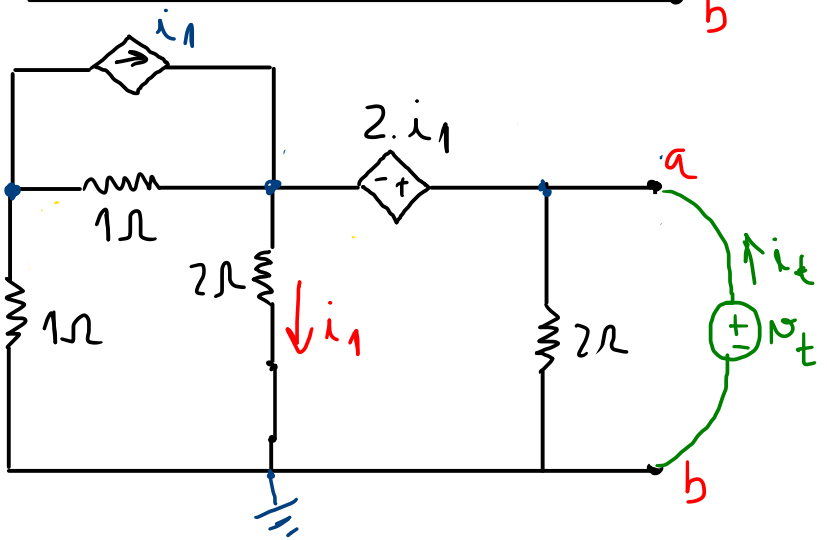
# EXERCÍCIO 02



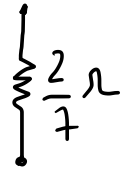

CÁLCULO DE $R_{TH}$:

$$R_{TH} = \frac{v_t}{i_t}$$



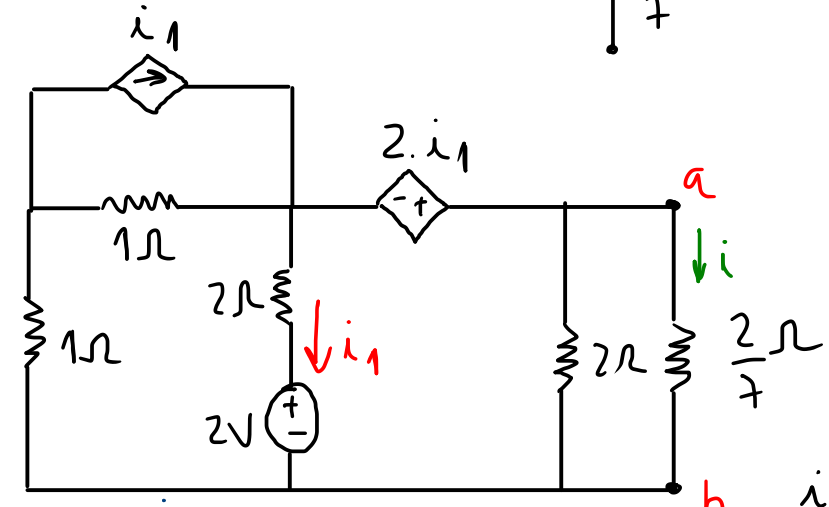



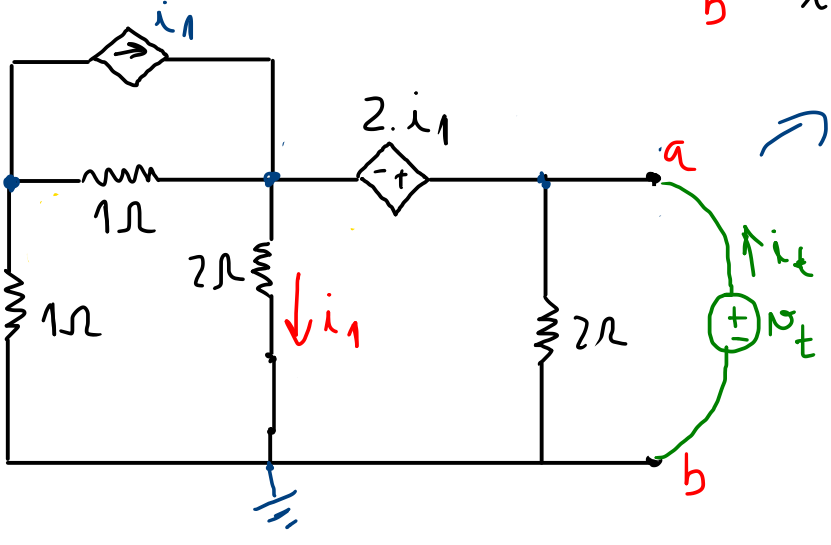
# EXERCÍCIO 02

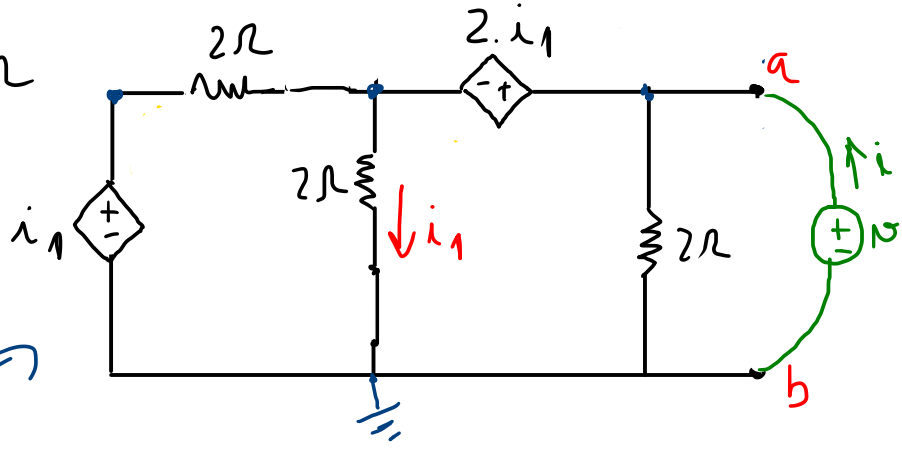



## CÁLCULO DE $R_{TH}$:

$$R_{TH} = \frac{v_t}{i_t}$$



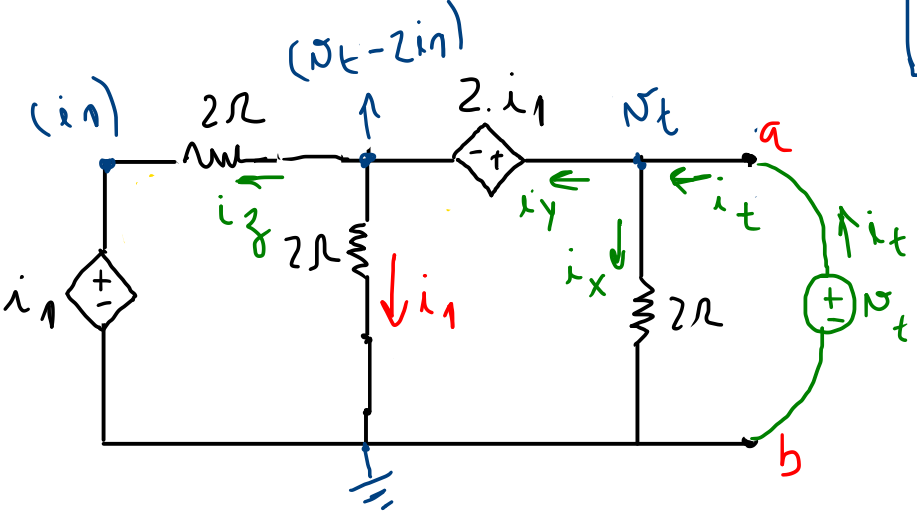



# EXERCÍCIO 02

$\frac{2}{7}\,\Omega$

CÁLCULO DE $R_{TH}$:

$$R_{TH} = \frac{v_t}{i_t}$$



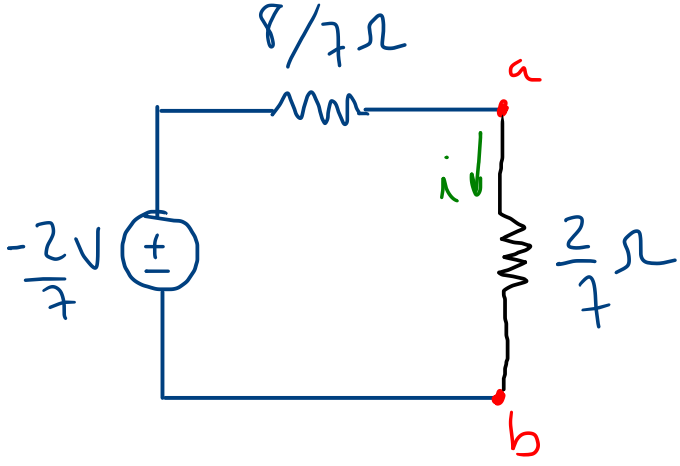

$$i_y + i_x = i_t$$

$$i_x + i_1 + i_z = i_t$$

$$\frac{v_t}{2} + \frac{v_t - 2i_N}{2} + \frac{v_t - 2i_1 - i_N}{2} = i_t \Rightarrow \boxed{\frac{v_t}{i_t} = R_{TH} = \frac{8}{7}\,\Omega}$$

Mas: $i_N = \frac{v_t - 2i_1}{2} \Rightarrow i_1 = \frac{v_t}{4}$

Finalmente: modelo equivalente de Thevenin




$$i = \frac{-2/7}{\frac{2}{7} + \frac{8}{7}} = -\frac{1}{5}\,A$$