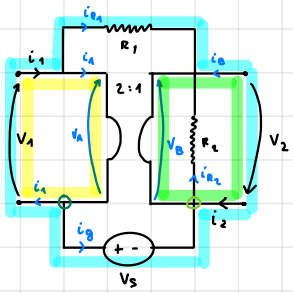
ESERCITAZIONE

ESERCIZIO 16 (10)



$R_1 = 1\,\Omega$ $\quad$ H? G?

$G_2 = 0.5\,\Omega$

$V_s = 1\,V$

$$\begin{cases} V_1 = h_{11} i_1 + h_{12} v_2 + V_{01} \\ i_2 = h_{21} i_1 + h_{22} v_2 + I_{01} \end{cases}$$

- $v_1 = V_A \rightarrow V_1 = -2 V_2$
- $V_2 = -V_B$
- $i_2 = -I_B - i_g - I_{R_2} \rightarrow i_2 = 2 I_A - i_g + \frac{V_2}{R_2} \rightarrow i_2 = 2 i_A - i_A + i_1 + \frac{V_2}{R_2} = i_A + i_1 + \frac{V_2}{R_2} = \frac{R_1 i_1 - V_s + V_2}{R_1} + i_1 + \frac{V_2}{R_2} = \dots = \underline{2 i_1 + \left[\frac{1}{R_1} + \frac{1}{R_2}\right] V_2 - \frac{1}{R_1} V_s}$ $\quad (I_B = -n I_A)$
- $i_g = i_A - i_1$
- $V_2 + V_s + V_1 = V_{R_1} \rightarrow V_s + \cancel{V_2} - \cancel{2 V_2} = R_1 i_{R_1} \rightarrow V_s - V_2 = R_1 i_{R_1} \rightarrow V_s - V_2 - R_1 (i_1 - i_A) \rightarrow i_A = \frac{R_1 i_1 - V_s + V_2}{R_1}$

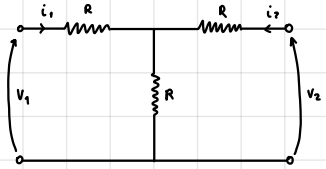
$$\downarrow$$

$$\begin{bmatrix} V_1 \\ i_2 \end{bmatrix} = \begin{bmatrix} 0 & -2 \\ 2 & \frac{1}{R_1} + \frac{1}{R_2} \end{bmatrix} \begin{bmatrix} V_2 \\ i_1 \end{bmatrix} + \begin{bmatrix} 0 \\ \frac{V_s}{R_1} \end{bmatrix} \rightarrow \begin{bmatrix} V_1 \\ i_2 \end{bmatrix} = \begin{bmatrix} 0 & -2 \\ 2 & 3 \end{bmatrix} \begin{bmatrix} V_2 \\ i_1 \end{bmatrix} + \begin{bmatrix} 0 \\ 1 \end{bmatrix}$$

Per trovare G esplicitiamo rispetto a i_1 e i_2:

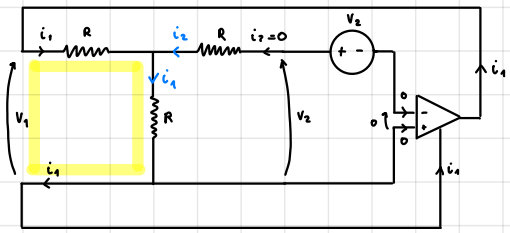
$$\begin{cases} \cancel{2} i_1 + \cancel{2} i_2 = -V_1 - 2 V_2 \\ -2 i_1 + i_2 = \cancel{2} V_1 + 3 V_2 \end{cases} \rightarrow \begin{vmatrix} 0 & 0 \\ -2 & 1 \end{vmatrix} = 0 \Rightarrow \nexists G$$

ESERCIZIO 2 (8)

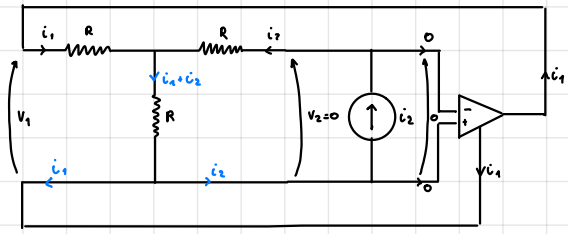


T con prove semplici?

Dobbiamo usare un op-amp.



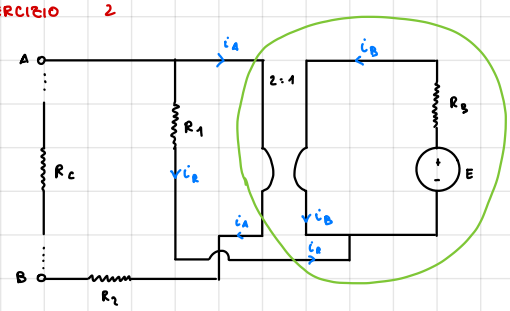
- $V_1 = 2R\, i_1$
- $i_1 = \frac{V_2}{R}$



… $V_1 = -3R\, i_2$

$i_1 = -2\, i_2$

ESERCIZIO 2



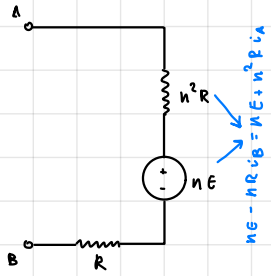
- $i_A + i_R = i_A$ → $i_R = 0$ → RESISTORE NON CONTA

$R_1 = R_3 = 1\,\Omega$, $R_c = 4\,\Omega$, $E = 2\,V$

Thevenin?

R_c in modo da avere il massimo trasferimento di potenza?

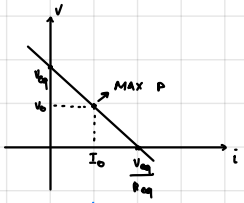
↓ semplificando



$R_{EQ} = R_2 + n^2R_3 = 8\,\Omega$ → $v = 8i + 4$

$V_{EQ} = nE = 4\,V$

$R_c = R_{eq} = 8\,\Omega$



→ $P_{MAX} = V_0 I_0 = R_c I_0^2$

$\frac{V_{eq}}{2} = R_c \frac{V_{eq}}{R_{eq}} \cdot \frac{1}{2}$ → $R_c = R_{eq}$

↓

Retta caratteristica del bipolo di Thevenin (Retta di carico)