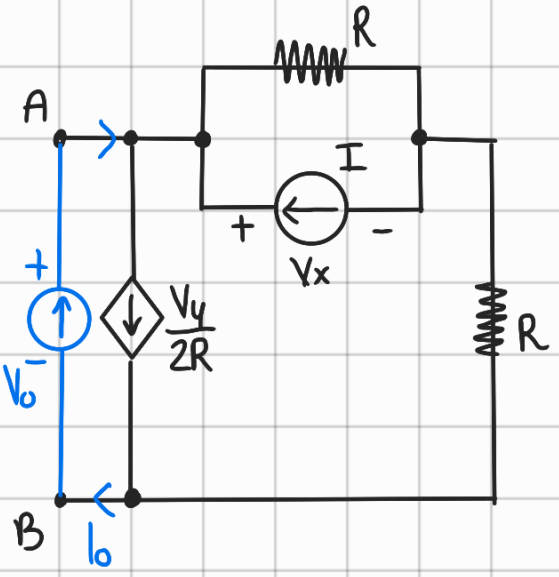
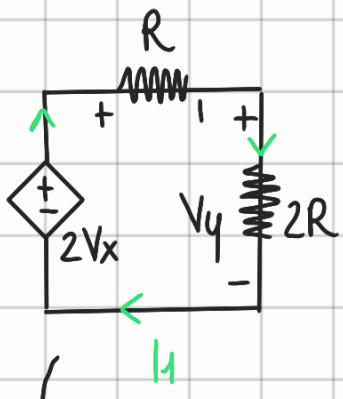
25 MAGGIO 2011 con il metodo rapido





KV: $\begin{cases} RI_1 + V_y - 2V_x = 0 \\ V_y = 2R\,I_1 \end{cases}$

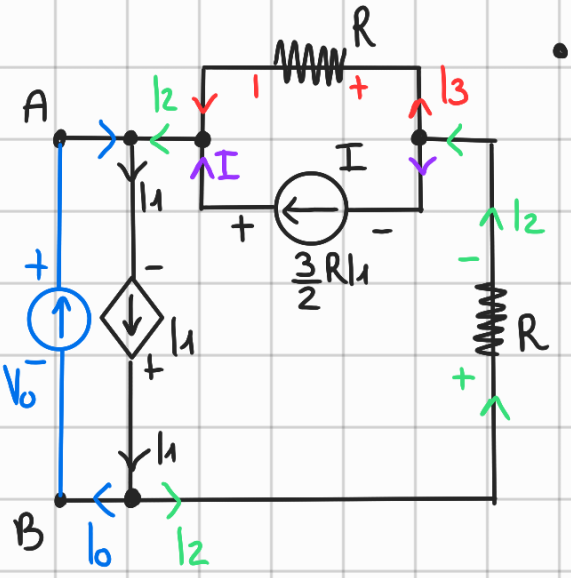
$\Rightarrow V_y = 2RI_1$

$RI_1 + 2RI_1 - 2V_x = 0$

$3RI_1 - 2V_x = 0$

$2V_x = 3RI_1$

$\bullet\ V_x = \frac{3}{2}RI_1$



KI: $\begin{cases} I_o + I_2 = I_1 \\ I + I_3 = I_2 \end{cases}$ $\Rightarrow$ $\boxed{I_o + I + I_3 = I_1}$

KV $+V_g + V_o = 0$ $\boxed{V_o = -V_g}$

$-\frac{3}{2}RI_1 - RI_3 = 0$ $\rightsquigarrow$ $\boxed{+\frac{3}{2}I_1 + I_3 = 0}$

$V_g = RI_2 - \frac{3}{2}RI_1$

$\curvearrowleft\ -RI_2 + V_g + \frac{3}{2}RI_1 = 0$

$\boxed{V_o = \frac{3}{2}RI_1 - RI_2}$

$I_3 = -\frac{3}{2} I_1$ $\quad I_0 + I - \frac{3}{2} I_1 = I_1$ $\quad 2I_0 + 2I - 3I_1 - 2I_1 = 0$

$2I_0 + 2I - 5I_1 = 0$

$I_2 = I_1 - I_0$ $\quad 5I_1 = 2I_0 + 2I$

$I_1 = \frac{2I_0 + 2I}{5}$

$$V_0 = \frac{3}{2} R \frac{2I_0 + 2I}{5} - R\left(\frac{2I_0 + 2I}{5} - I_0\right)$$

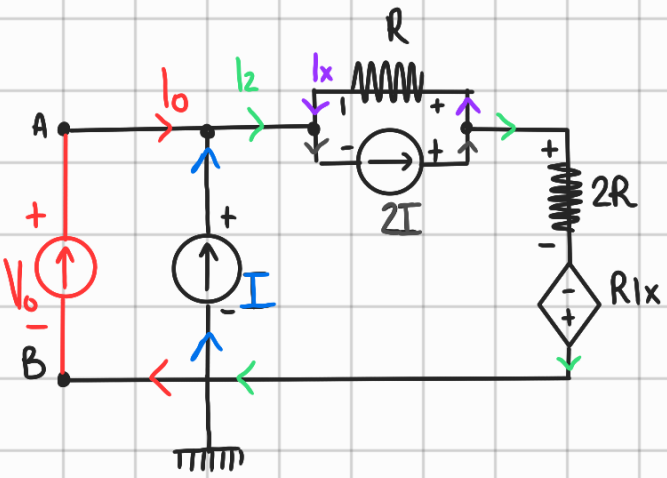
$$= \frac{3(2I_0 + 2I)}{10} R - \frac{2I_0 + 2I}{5} R + RI_0 =$$

$$= \frac{6RI_0 + 6RI - 4RI_0 - 4RI + 10RI_0}{10} = \frac{12RI_0}{10} + \frac{2}{10} IR$$

$V_0 = \frac{6}{5} RI_0 + \frac{1}{5} RI$ $\quad V_{eq} = \frac{1}{5} RI$ V

$R_{eq} = \frac{6}{5} R$ Ω

1 LUGLIO 2011, es 1 Thevenin con il metodo rapido



$V_o = V_{eq} + R_{eq} I_o$

KI: $I_o + I - 2I + I_x = 0$

$\boxed{I_o + I_x = I}$

$I_2 = I_o + I$

KV: ↻

- $V_{gc1} = V_o$
- $V_{gc2} = RI_x$
- $2RI_2 - RI_x - V_{gc1} - V_{gc2} = 0$

$2R(I_o + I) - R(I - I_o) - V_o - R(I - I_o) = 0$

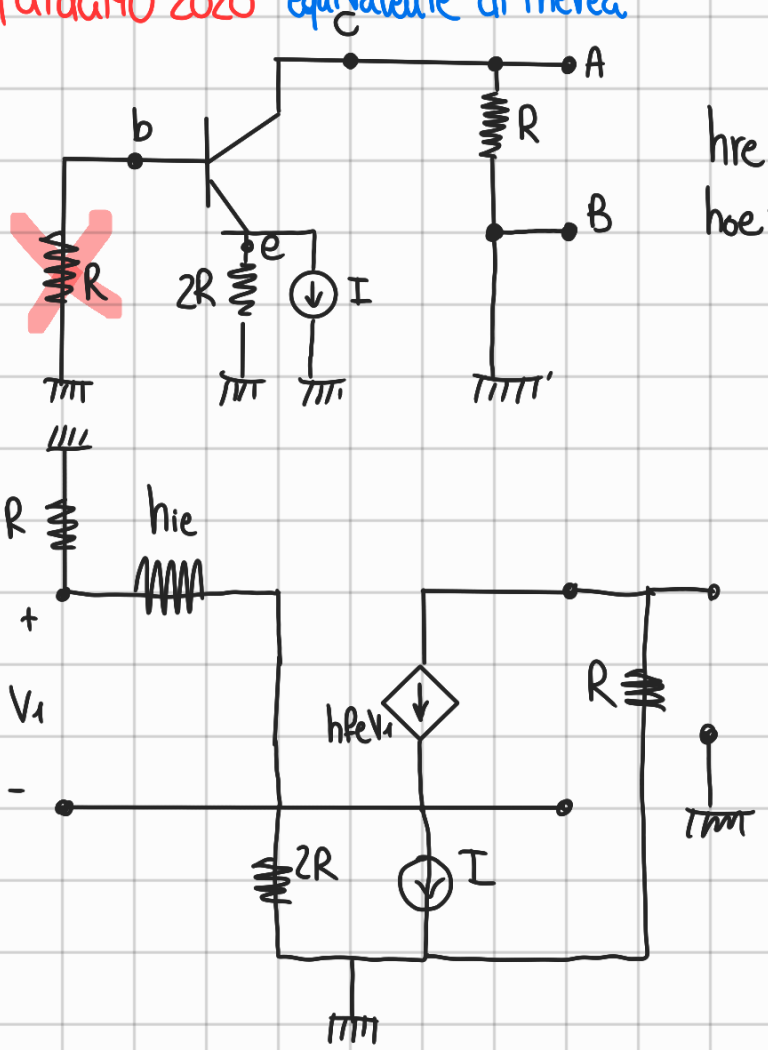
$2RI_o + 2RI - RI + RI_o - V_o - RI + RI_o = 0$

$V_o = 4RI_o$

$V_{eq} = 0$

$R_{eq} = 4R$

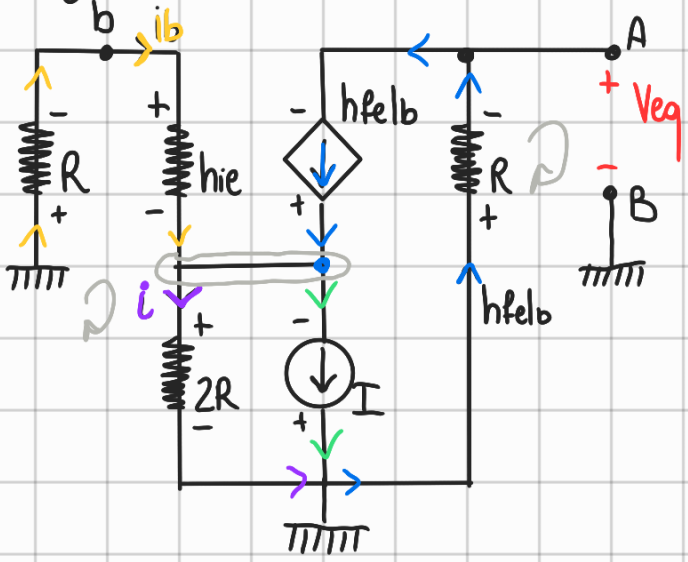
29 GIUGNO 2020 equivalente di Thevenin



$h_{re} = 0$

$h_{oe} = 0\ \Omega^{-1}$

Rideagno il tutto



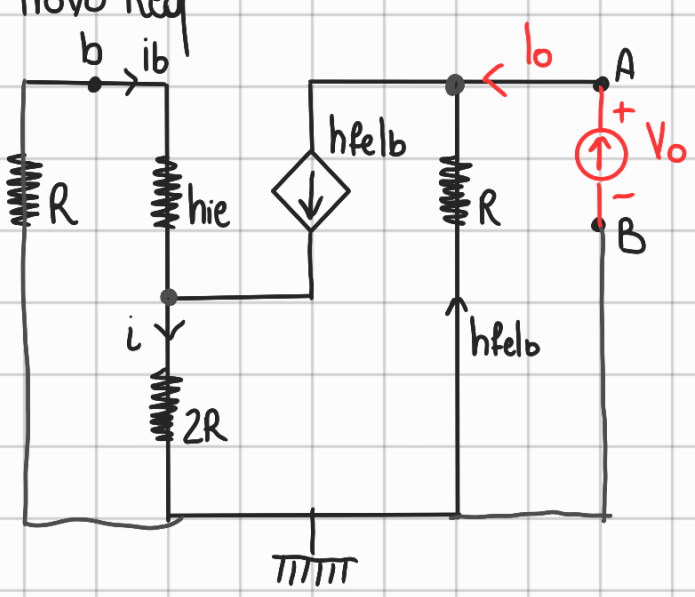
KI $I_b + h_{fe} I_b = i + I$ $\Rightarrow$ $I_b = \dfrac{2RI}{R + h_{ie} + 2R(1+h_{fe})}$

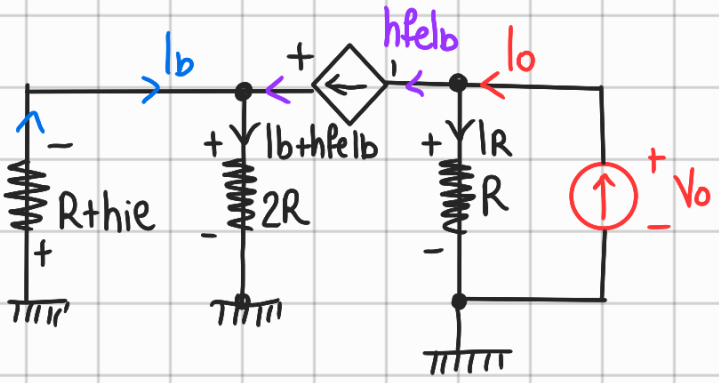
KV $RI_b + h_{ie} I_b + 2Ri = 0$

$V_{eq} + Rh_{fe} I_b = 0$

$\rightsquigarrow$ $V_{eq} = -Rh_{fe} I_b = -Rh_{fe} \dfrac{2RI}{R + h_{ie} + 2R(1+h_{fe})}$ ✓

Trovo Req





KV $2R I_b (1+h_{fe}) + (R+h_{ie}) I_b = 0$

$I_b (2R(1+h_{fe}) + R + h_{ie}) = 0$

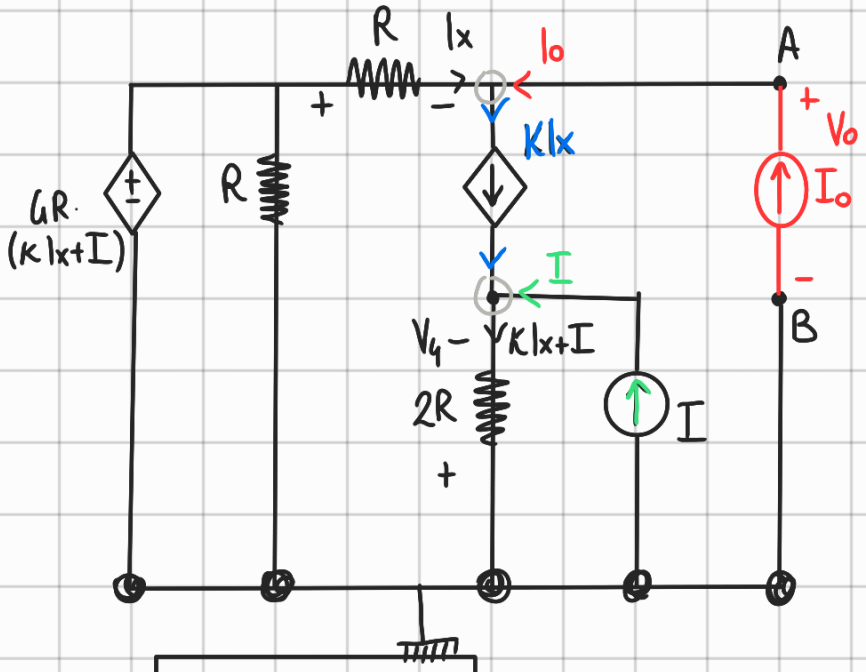
$I_b = 0$

$\Rightarrow I_o = I_R$

$V_o = R I_R$

$R_{eq} = \frac{R I_R}{I_R} = R$

ESERCIZIO IN CLASSE Thererin con metodo rapido



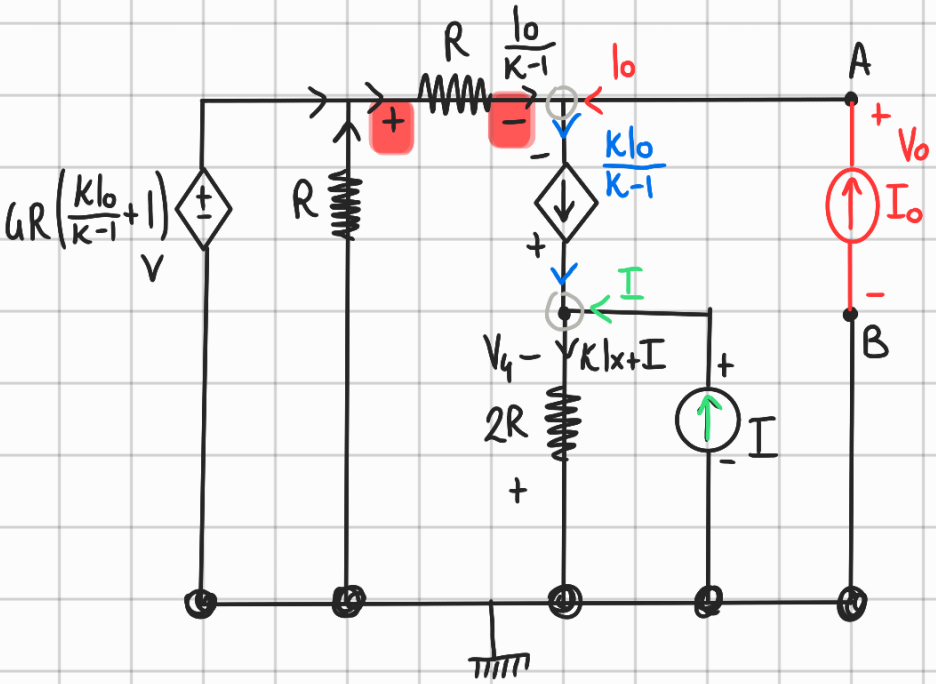
trovo $\boxed{V_4 = 2R(KI_x + I)}$

KI $I_x + I_o = KI_x \rightsquigarrow I_o = KI_x - I_x \quad I_x(K-1) = I_o \quad \boxed{I_x = \frac{I_o}{K-1}}$

$V_4 = 2R\left(K\frac{I_o}{K-1} + I\right)$

quindi ho trovato tutte le grandezze di controllo

$I_x = \frac{I_o}{K-1} \qquad V_4 = 2R\left(\frac{KI_o}{K-1} + I\right)$



KV ↻

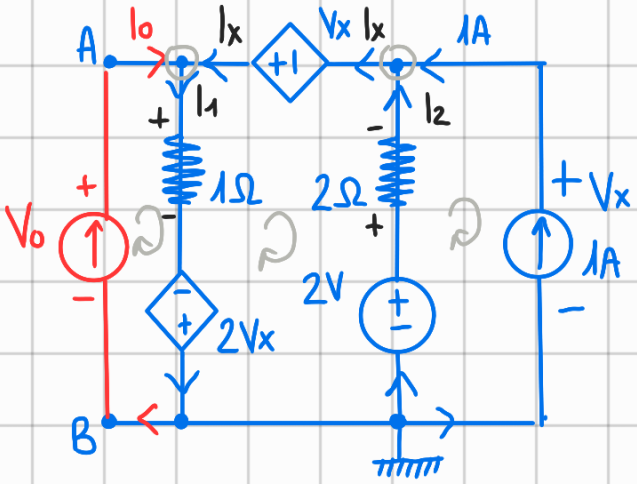
$$\begin{cases} V_o - V_{gI} + V_{gx} = 0 \\ V_{gI} + V_4 = 0 \\ +V_{gx} - V_4 - R\frac{I_o}{K-1} = 0 \end{cases}$$

$V_{gI} = -V_4$

$V_{gx} = R\frac{I_o}{K-1} + V_4 \qquad V_o = V_{gI} - V_{gx} = -V_4 - \frac{RI_o}{K-1} - V_4 = -\frac{RI_o}{K-1} - 2V_4 =$

e vai a calcoli

13 NOV 2008 es 1 Thevenin OK



Uso il metodo rapido $V_0 = V_{eq} + R_{eq} I_0$

- Studio le correnti $V = RI$ $\quad I = \frac{V}{R}$

KI $\quad I_0 - I_1 + I_2 + 1 = 0$

KV $\quad V_x - 2 + 2I_2 = 0$

$-2I_2 + 2 + 2V_x - I_1 + V_x = 0$

$-I_1 + 2V_x + V_0 = 0$

$\rightsquigarrow \begin{cases} I_2 = I_1 - I_0 - 1 \\ V_x = 2 - 2I_2 \\ 3V_x - 2I_2 - I_1 + 2 = 0 \end{cases}$ $\quad V_x = 2 - 2I_1 + 2I_0 + 2$

$\rightsquigarrow V_0 = I_1 - 2V_x$

$3(2 - 2I_1 + 2I_0 + 2) - 2(I_1 - I_0 - 1) - I_1 + 2 = 0$

$6 - 6I_1 + 6I_0 + 6 - 2I_1 + 2I_0 + 2 - I_1 + 2 = 0$

$16 - 9I_1 + 8I_0 = 0$

$-9I_1 = +16 + 8I_0$

$$\Rightarrow V_0 = \frac{16 + 8I_0}{9} - 2\left(4 - 2\frac{16 + 8I_0}{9} + 2I_0\right) =$$

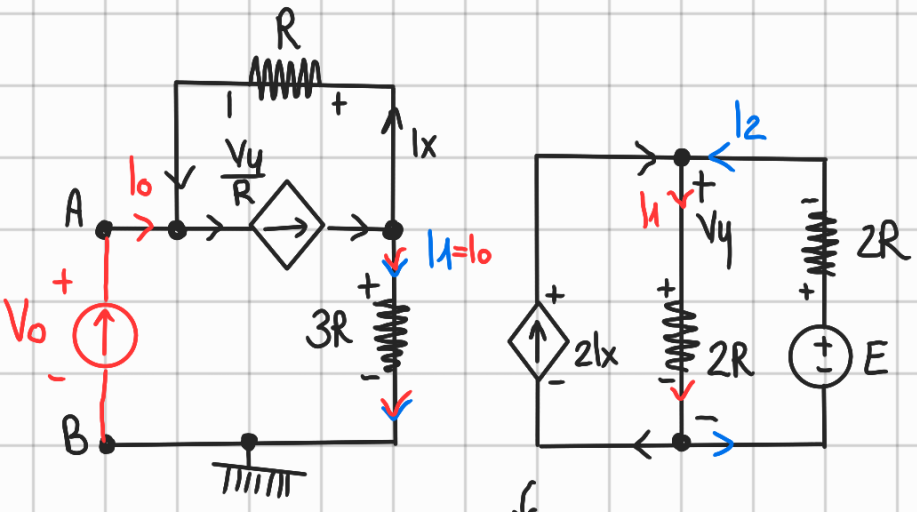
$$= \frac{16 + 8I_0}{9} - 8 + \frac{4(16 + 8I_0)}{9} - 4I_0 = \frac{16 + 8I_0 - 72 + 64 + 32I_0 - 36I_0}{9} =$$

$$= \frac{4}{9}I_0 + \frac{8}{9}$$

$V_{eq} = 8/9$ V

$R_{eq} = 4/9\ \Omega$

9 NOV 2006 es 1 Thevenin AB con il metodo rapido OK



↓

Studio questo circuito per trovare V_4

$$\text{KI: } 2I_x + I_2 = I_1 \quad \cdot I_1 = \frac{V_4}{2R}$$
$$\text{KV: } -2RI_2 + E - V_4 = 0$$
$$V_4 - V_{gI} = 0$$

$$\rightsquigarrow \begin{cases} 2I_x + I_2 = \frac{V_4}{2R} \\ \hookrightarrow I_2 = \frac{V_4}{2R} - 2I_x \\ V_g = +V_{gI} \end{cases}$$

$$-2R\left(\frac{V_4}{2R} - 2I_x\right) + E - V_4 = 0$$
$$-V_4 + 4RI_x + E - V_4 = 0 \rightsquigarrow +2V_4 = +4RI_x + E$$

$$V_4 = 2RI_x + \frac{E}{2} \quad \checkmark \qquad \text{Gen. corrente } \boxed{2I_x + \frac{E}{2R}}$$

$V_0 = V_{eq} + R_{eq} I_0$

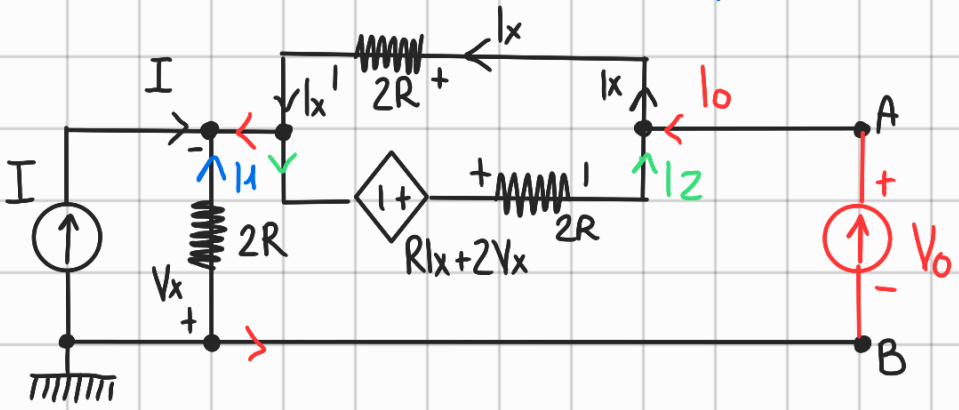
$$\text{KI: } I_0 + I_x = 2I_x + \frac{E}{2R} = I_x + I_1 \quad \cdot I_0 = I_1$$
$$\text{KV: } \begin{cases} -RI_x + V_{gc} = 0 \\ -3RI_1 + V_0 + V_{gc} = 0 \end{cases}$$

$$V_0 = 3RI_0 - V_{gc} \rightsquigarrow V_{gc} = RI_x \rightsquigarrow I_x - 2I_x = \frac{E}{2R} - I_0$$
$$+I_x = I_0 - E/2R$$
$$= R\left(I_0 - \frac{E}{2R}\right) = RI_0 - \frac{E}{2}$$

$$V_0 = 3RI_0 - RI_0 + \frac{E}{2} =$$

$$= 2RI_0 + \frac{E}{2} \qquad R_{eq} = 2R \qquad V_{eq} = E/2$$

3 2006 es 1 Thevenin AB con il metodo rapido



$V = RI$

$I = \frac{V}{R}$

KI: $\begin{cases} I + I_1 + I_x = I_2 \\ I_o + I_2 = I_x \\ I_1 = \frac{V_x}{2R} \end{cases}$ KV: $\begin{cases} -2RI_2 + RI_x + 2V_x - 2RI_x = 0 \\ V_o + V_x - RI_x - 2V_x + 2RI_2 = 0 \\ -V_x - V_g = 0 \end{cases}$

$\Downarrow$

$\begin{cases} I + \frac{V_x}{2R} + I_x = I_2 \\ I_x = I_o + I_2 \\ V_x = -(I_o + I)2R \end{cases}$ $\rightsquigarrow$ $I + \frac{V_x}{2R} + I_o + I_2 = I_2$

$I + \frac{V_x}{2R} + I_o = 0$

$\downarrow$

$\frac{V_x}{2R} = (-I_o - I)2R$

- $2V_x - RI_x - 2RI_2 = 0 \rightsquigarrow -4R(I_o + I) - RI_o - RI_2 - 2RI_2 = 0$

$+4RI_o + 4RI + RI_o + RI_2 + 2RI_2 = 0$

$5RI_o + 3RI_2 + 4RI = 0$

$3RI_2 = \frac{-4RI - 5RI_o}{3R} = -\frac{4}{3}I - \frac{5}{3}I_o$

$I_2 = -\frac{4}{3}I - \frac{5}{3}I_o$

- $V_o - V_x - RI_x + 2RI_2 = 0 \qquad V_o = V_x + RI_x - 2RI_2 =$

$= -2RI_o - 2RI + RI_o + RI_2 - 2RI_2 =$

$= -RI_o - 2RI - RI_2$

$= -RI_o - 2RI + R\frac{4}{3}I + \frac{5}{3}RI_o = \frac{2}{3}RI_o - \frac{2}{3}RI$

$V_o = V_{eq} + R_{eq}I_o$

$\downarrow$

$R_{eq} = \frac{2}{3}R \qquad V_{eq} = -\frac{2}{3}RI$