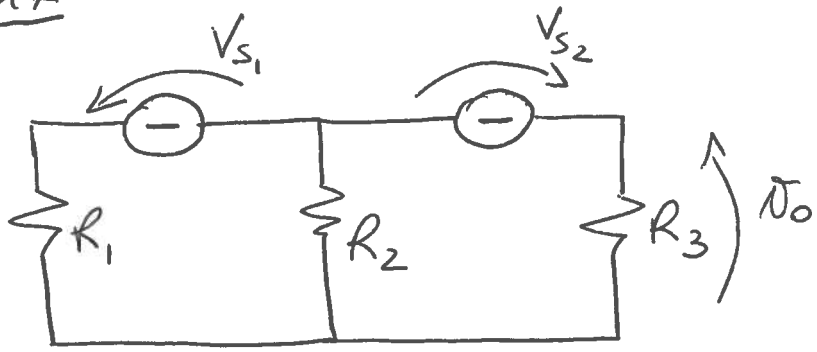
ES 17



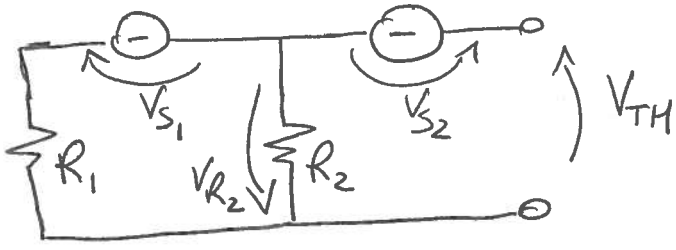
$V_{S_1} = 6\,V$

$V_{S_2} = 12\,V$

$R_1 = R_3 = 2\,\Omega$

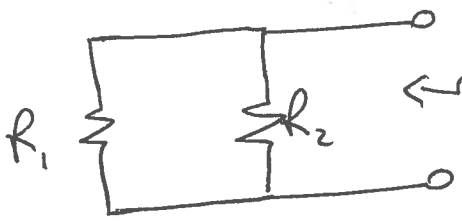
$R_2 = 4\,\Omega$

CALCOLIAMO I PARAMETRI DEL MODELLO EQUIVALENTE DI THÉVENIN

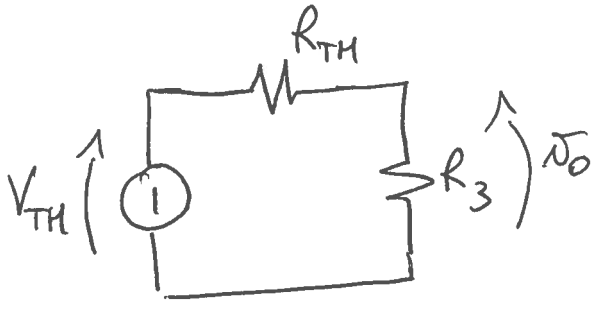


$$V_{R_2} = \frac{R_2}{R_1 + R_2} V_{S_1} \qquad V_{TH} = V_{S_2} - V_{R_2}$$

$$= V_{S_2} - \frac{R_2}{R_1 + R_2} V_{S_1} = 8V$$

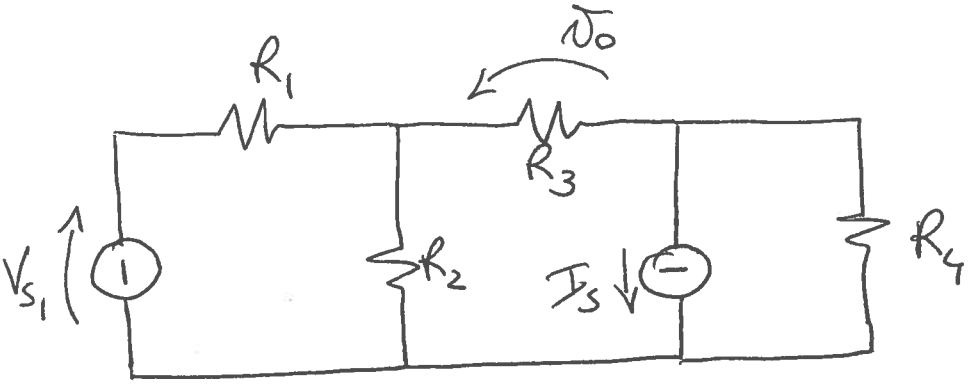


$$\leftarrow R_{TH} = \frac{R_1 R_2}{R_1 + R_2} = \frac{4}{3}\,\Omega$$



$$v_o = \frac{R_3}{R_3 + R_{TH}} V_{TH} = \frac{24}{5}\,V$$

ES 18



$V_S = 12V$

$I_S = 2A$

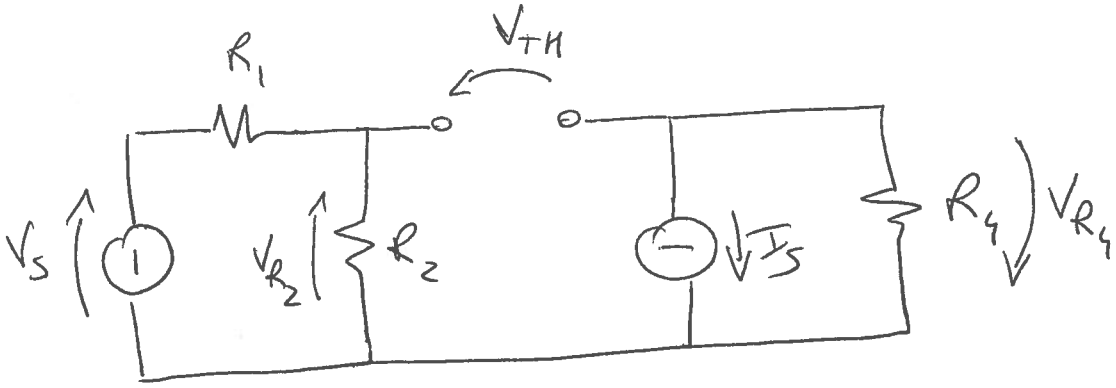
$R_1 = 3\Omega$

$R_2 = 6\Omega$

$R_3 = 8\Omega$

$R_4 = 2\Omega$

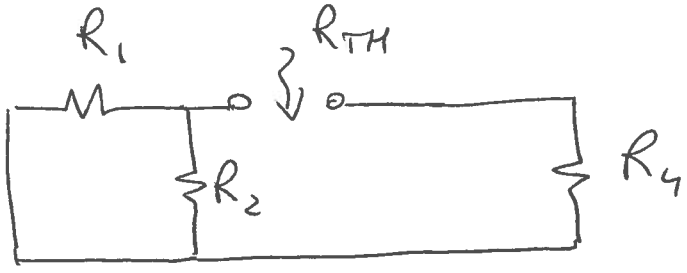
V_{TH}



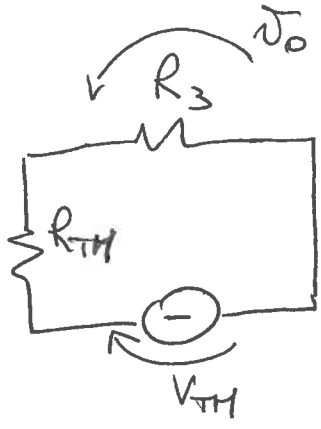
$$V_{R_2} = \frac{R_2}{R_1+R_2} V_S \qquad V_{R_4} = R_4 I_S$$

$$V_{TH} = V_{R_2} + V_{R_4} = \frac{R_2}{R_1+R_2} V_S + R_4 I_S = 12V$$

R_{TH}

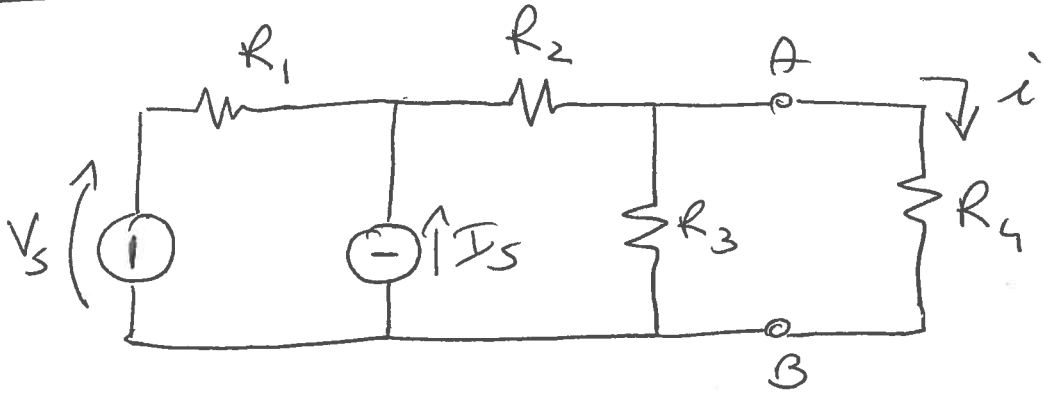


$$R_{TH} = \frac{R_1 R_2}{R_1+R_2} + R_4 = 4\Omega$$



$$v_o = \frac{R_3}{R_3+R_{TH}} V_{TH} = 8V$$

ES 19



$V_S = 12V$

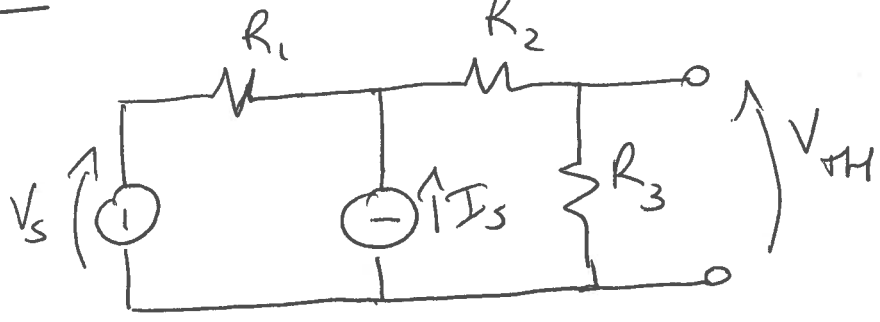
$I_S = 2A$

$R_1 = R_2 = 6\Omega$

$R_3 = 4\Omega$

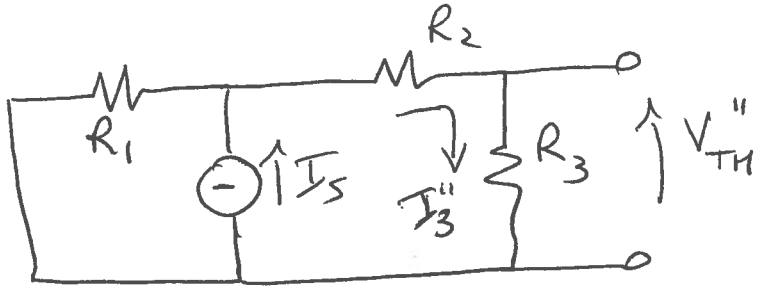
$R_4 = 1\Omega$

V_{TH}



SOVRAPPOSIZIONE

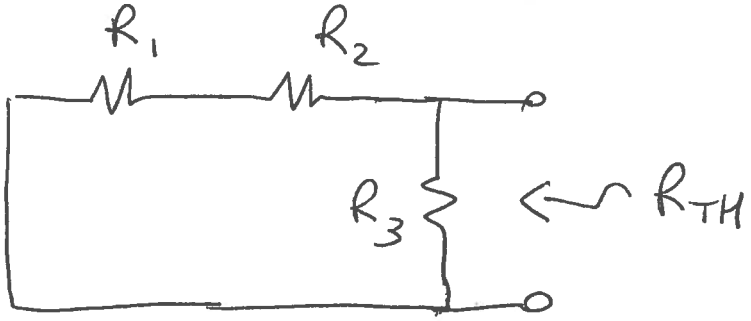
$$V'_{TH} = \frac{R_3}{R_1+R_2+R_3} V_S$$



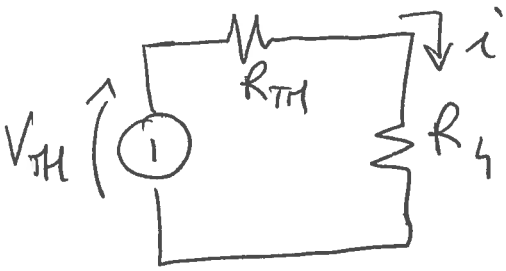
$$I''_3 = \frac{R_1}{R_1+R_2+R_3} I_S \qquad V''_{TH} = \frac{R_1 R_3}{R_1+R_2+R_3} I_S$$

$$V_{TH} = V'_{TH} + V''_{TH} = \frac{R_3}{R_1+R_2+R_3} V_S + \frac{R_1 R_3}{R_1+R_2+R_3} I_S = 6V$$

R_{TH}

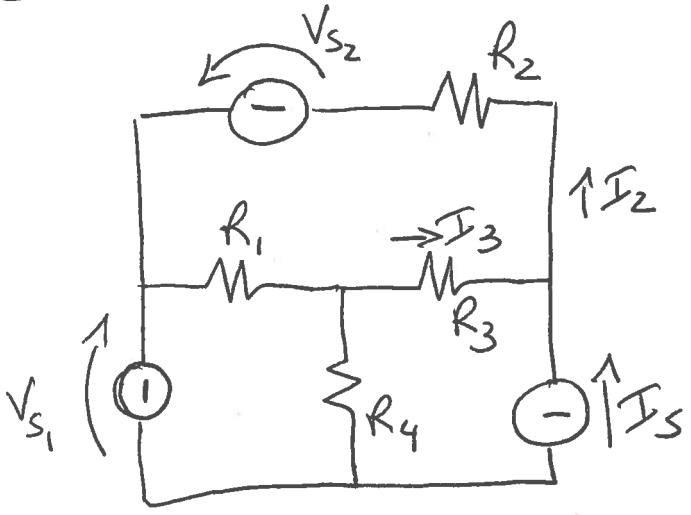


$$R_{TH} = \frac{R_3(R_1+R_2)}{R_1+R_2+R_3} = 3\,\Omega$$



$$i = \frac{V_{TH}}{R_4+R_{TH}} = \frac{3}{2}\,A$$

ES 20



$V_{S_1} = 6\,V$

$V_{S_2} = 10\,V$

$I_S = 2\,A$

$R_1 = 6\,\Omega$

$R_2 = 7\,\Omega$

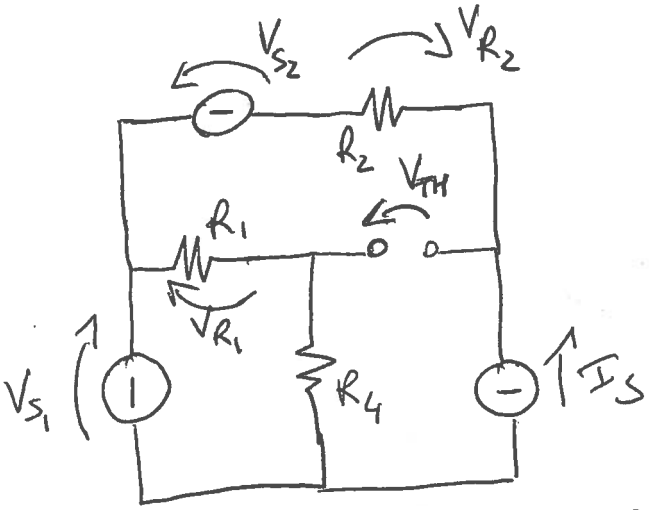
$R_3 = 5\,\Omega$

$R_4 = 3\,\Omega$

$I_3 = ?$

potenza erogata V_{S_2}

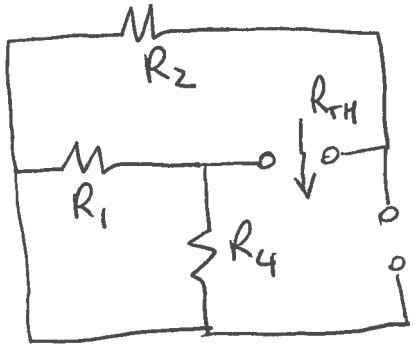
potenza assorbita da R_3



$$V_{R_2} = R_2 I_S = 14\,A$$

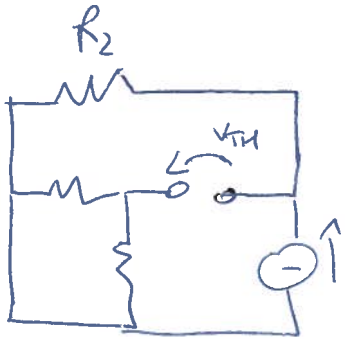
$$V_{R_1} = \frac{R_1}{R_1+R_4} V_S = 4\,V$$

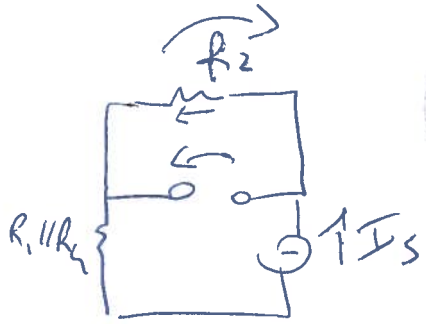
$$V_{TH} = V_{S_2} - V_{R_1} - V_{R_2} = V_{S_2} - \frac{R_1}{R_1+R_4} V_S - R_2 I_S = -8\,V$$



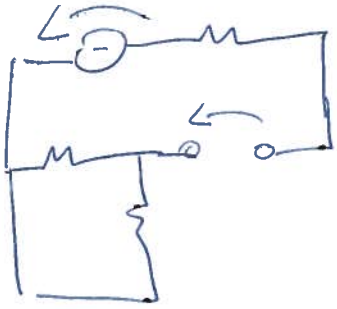
$$R_{TH} = R_1 /\!/ R_4 + R_2$$

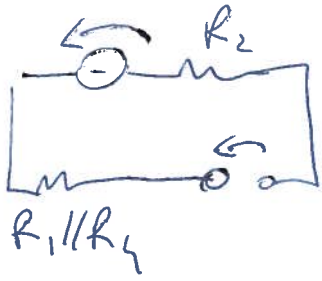
$$= \frac{R_1 R_4}{R_1+R_4} + R_2 = 9\,\Omega$$



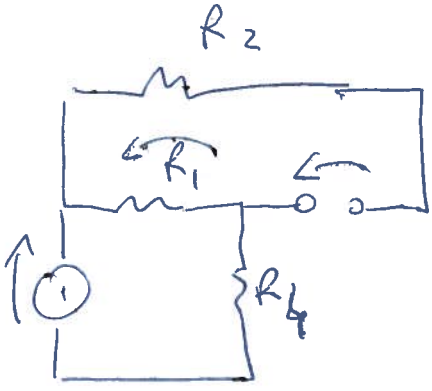


$-R_2 I_S$

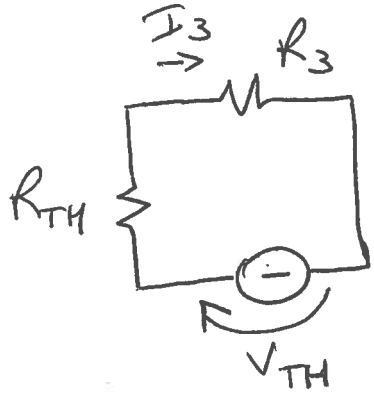




V_{S_2}



$$-V_{R_1} = -V_{S_1} \frac{R_1}{R_1 + R_4}$$



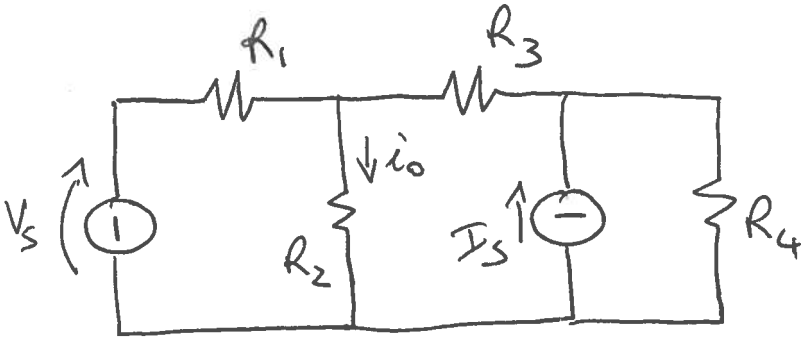
$$I_3 = \frac{V_{TH}}{R_3 + R_{TH}} = -\frac{4}{7}\,A$$

$$I_2 = I_S + I_3 = \frac{10}{7}\,A$$

$$P_{V_{S_2}} = V_{S_2} I_2 = \frac{100}{7}\,W$$

$$P_{R_3} = R_3 I_3^2 = \frac{80}{49}\,W$$

ES 21



$V_S = 6\,V$

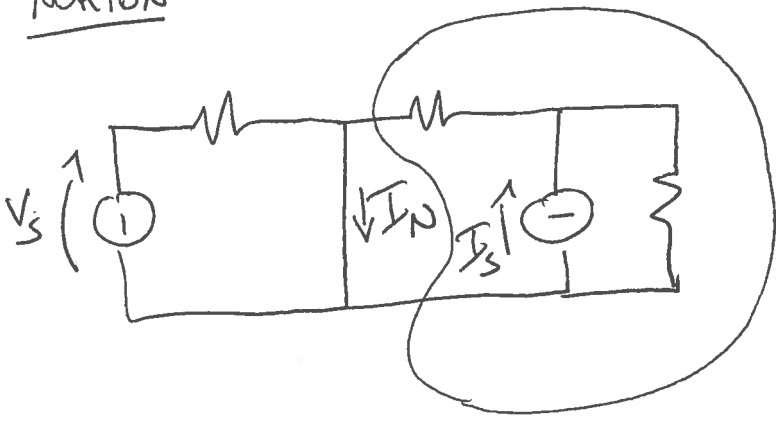
$I_S = 2\,mA$

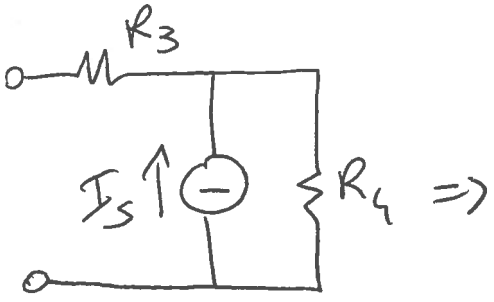
$R_1 = 6\,k\Omega$

$R_2 = 2\,k\Omega$

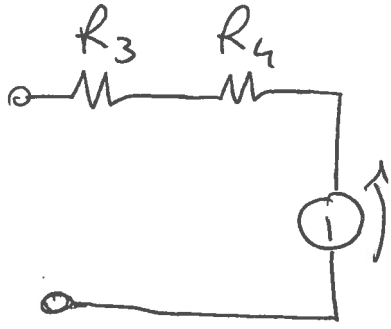
$R_3 = R_4 = 3\,k\Omega$

NORTON

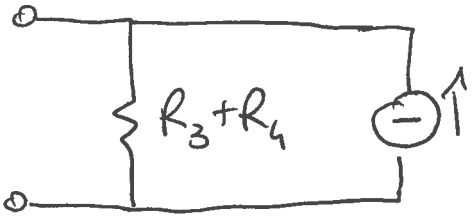




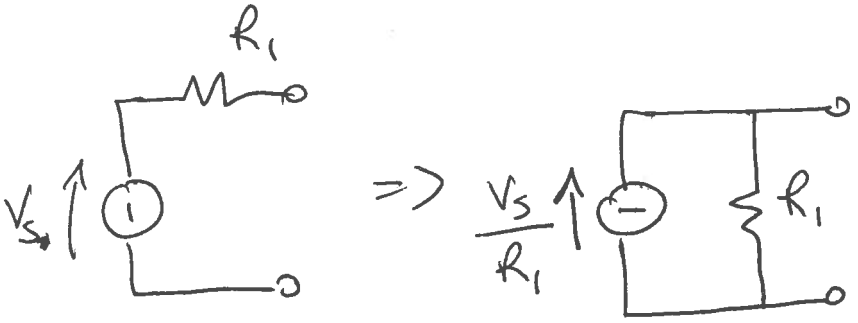
$\Rightarrow$



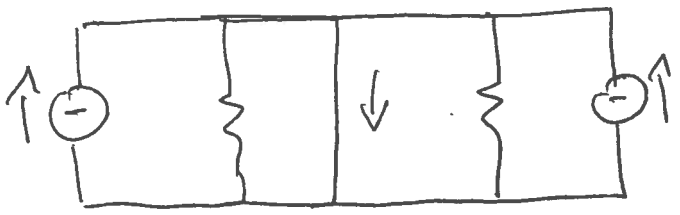
$V_{S_2} = R_4 I_S$



$$\frac{R_4 I_S}{R_3+R_4} = I_{S_2}$$

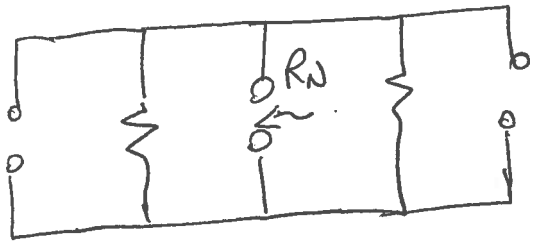


$\Rightarrow$

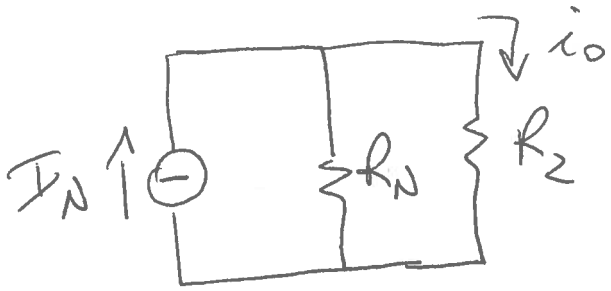


$$I_N = \frac{V_S}{R_1} + \frac{R_4 I_S}{R_3+R_4} = 2\,mA$$

R_N



$$R_N = \frac{R_1(R_3+R_4)}{R_1+R_3+R_4}$$



$$i_o = \frac{R_N}{R_2+R_N} I_N = \frac{6}{5}\ mA$$