ELETTROTECNICA

ESERCIZI FATTI A LEZIONE

DATI PERSONALI

~~ELETTRICA~~

Nome

Giuliana

Cognome

Ghetti

Indirizzo

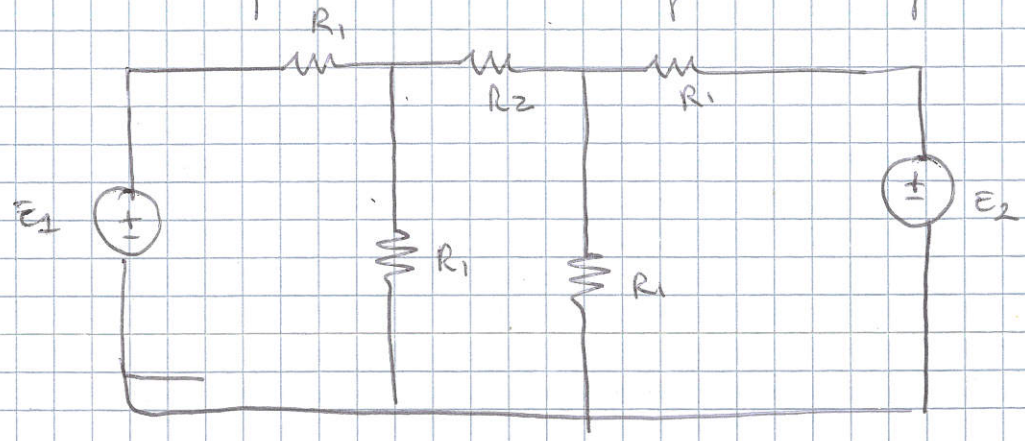
Telefono

Skype

e-mail

ETC SOVRAPPOSIZIONE EFFETTI

- Calcolare la potenza totale erogata dai generatori



$E_1 = 10\ V$

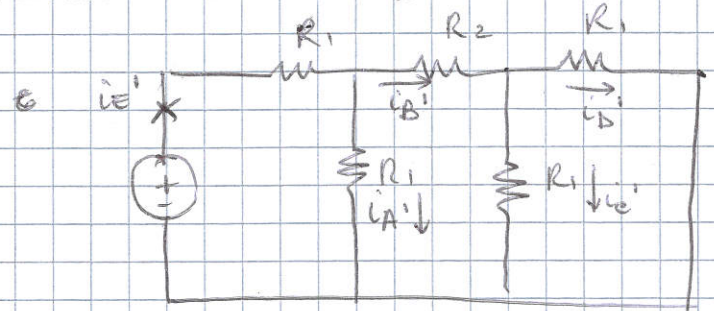
$E_2 = 20\ V$

$R_1 = 2\ \Omega$

$R_2 = 1\ \Omega$

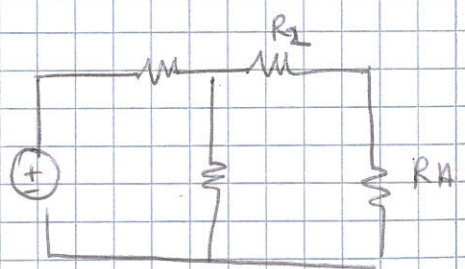
Sovrapposto

Lascio acceso E_1

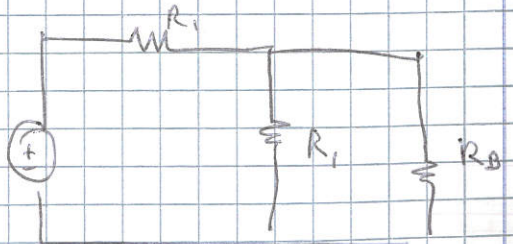


$i_D' = i_E''$

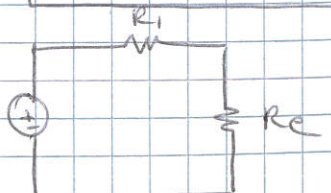
$R_A = R_2 \frac{1}{R_1} + \frac{1}{R_1} = 1\ \Omega$



$R_B = R_A + R_2 = 2\ \Omega$

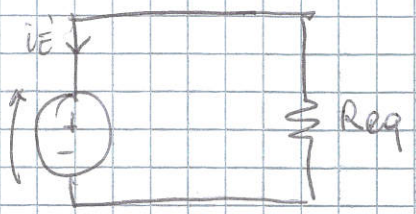


$R_C = R_B \frac{1}{R_B} + \frac{1}{R_1} = 1\ \Omega$



$R_D = R_1 + R_C = 3\ \Omega = R_{eq}$

λ



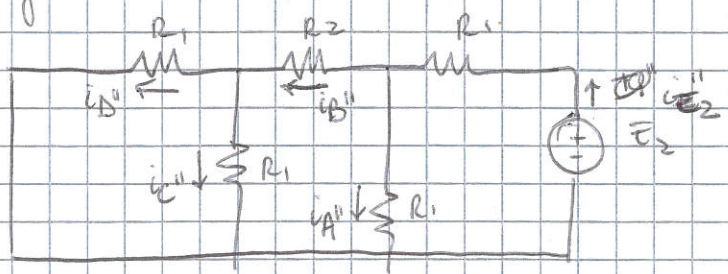
$$i_{E_1}' = \frac{E_1}{Req} = \frac{10}{3} \text{ A}$$

$$i_D' = i_E' \frac{R_1}{R_1+R_1} = \frac{5}{3} \text{ A}$$

$$i_{E_2}' = i_D' \frac{R_1}{R_1+R_1} = \frac{10}{9}$$

$$i_D' = i_{E_2}' = i_B' \frac{R_2}{R_2+R_1} = \frac{R_1}{R_1+R_1} = -\frac{5}{6} \text{ A}$$

Spengo generatore E_1



$$R_A = R \frac{1}{R_1} + \frac{1}{R_1} = 1 \ \Omega$$

$$R_B = R_A + R_2 = 3 \ \Omega$$

$$R_C = \frac{1}{R_B} + \frac{1}{R_1} = 1 \ \Omega$$

$$R_D = R_{eq} = R_C + R_1 = 3 \ \Omega$$

$$i_{E_2}'' = Req \frac{E_2}{Req} = \frac{20}{3} \text{ A}$$

$$i_B'' = i_E'' \cdot \frac{R_1}{R_1+R_1} = \frac{10}{3}\ A$$

$$i_B'' = i_{E_1}'' = i_B'' \frac{R_1}{R_1+R_1} = \frac{5}{3}\ A$$

$$i_{E_1} = i_{E_1}' + i_{E_1}'' = \frac{10}{3} - \frac{5}{3} = \frac{5}{3} = 5$$

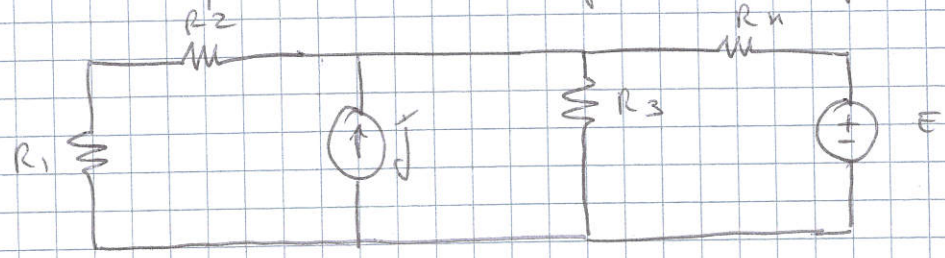
$$i_{E_2} = i_{E_2}' + i_{E_2}'' = -\frac{5}{6}\ A + \frac{20}{3}\ A = \frac{35}{6}\ A$$

$$P_{erog\,E_1} = E_1\, i_{E_1} = 10 \cdot \frac{5}{3} = \frac{50}{3} = 16.67\ W \quad \checkmark$$

$$P_{erog\,E_2} = E_2\, i_{E_2} = 20 \cdot \frac{35}{6} = 116.67\ W = 0.012\ kW \quad \checkmark$$

Es 3.3

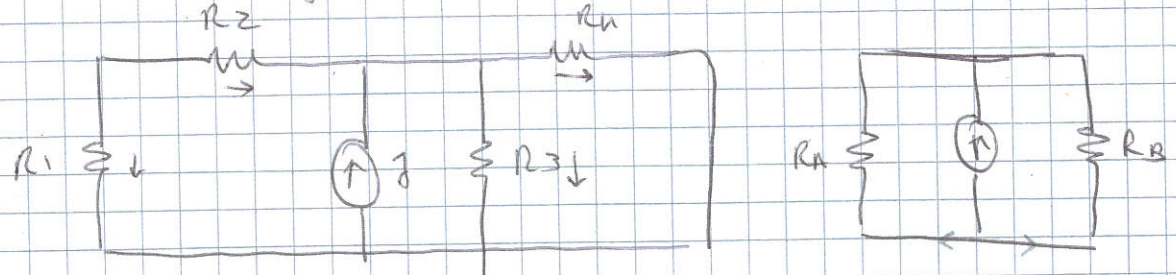
Calcolare la potenza totale erogata dai generatori



$E = 50\ V \quad J = 20\ A \quad R_1 = 1\ \Omega \quad R_2 = 5\ \Omega$

$R_3 = R_A = 10\ \Omega$

lascio acceso J



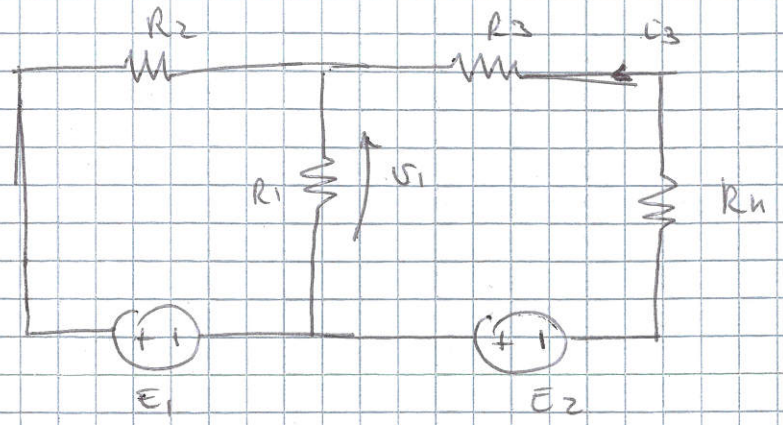
$R_A = R_1 + R_2 = 6\ \Omega$

$$R_B = \frac{1}{R_4} + \frac{1}{R_3} = \frac{1}{5}\ A$$

$$R_e = R_{ep} = \frac{1}{R_A} + \frac{1}{R_B} = \frac{31}{6}\ A = R_{ep}$$

$$U_j' = \int R_{ep} = \frac{310}{3}\ V$$

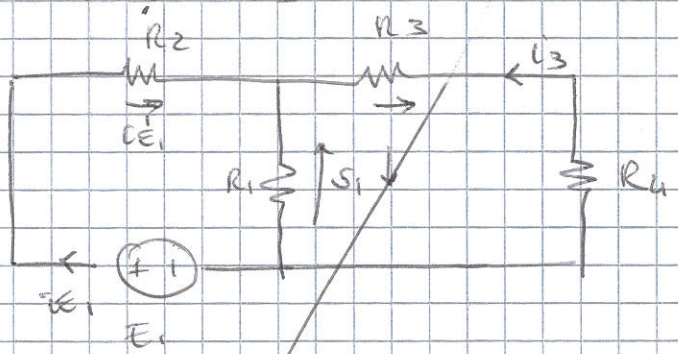
3.4 Si calcoli la tensione v_1 e la corrente i_3



$R_1 = R_2 = R_3 = R_n = 2\ \Omega$

$E_1 = 5\ V \qquad E_2 = 2\ V$

Lasciso acceso E_1



$R_A = R_3 + R_n = 4\ \Omega$

$R_B = R_A \,//\, R_n = \frac{1}{\frac{1}{R_A} + \frac{1}{R_n}} = \frac{3}{4}\ \Omega$

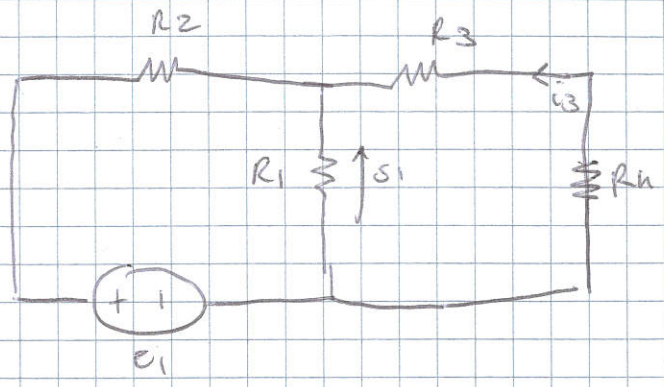
$R_{eq} = R_{eq} = R_B + R_2 = \frac{11}{4}\ \Omega$

$i'_{E_1} = \frac{E_1}{R_{eq}} = \frac{20}{11}\ A$

$v'_1 = \frac{i_1}{R_1} = \frac{5}{11}\ A$

$i'_1 = i'_{E_1} \frac{R_n}{R_1 + R_n} = \frac{10}{11}\ A$

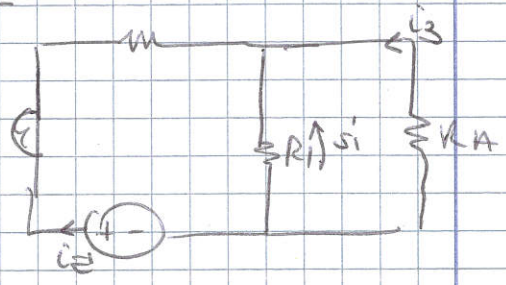
Lasco acceso E_1



$R_A = R_3 + R_n = 4\ \Omega$

$R_{eq} = R \frac{1}{R_A} + \frac{1}{R_1} = \frac{3}{4}\ A$

$R_e = R_{eq} = R_B + R_2 = \frac{11}{4}\ \Omega$



$R_B = \frac{R_A R_1}{R_A + R_1} = \frac{4}{3}\ A$

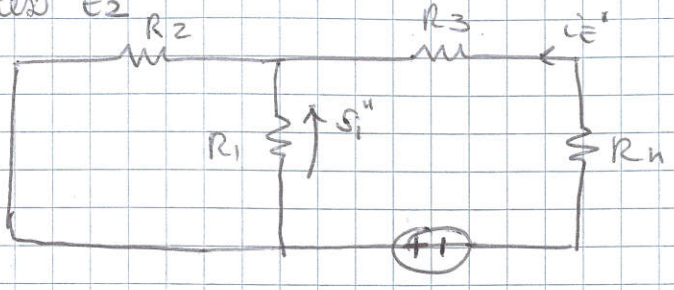
$R_e = R_B + R_2 = \frac{10}{3}\ A = R_{eq}$

$i_{E_1}' = \frac{E_1}{R_e} = \frac{3}{2}\ A$

$i_1' = i_{E_1}' \frac{R_A}{R_1 + R_A} = 1\ A \Rightarrow S_1' = i_{E_1}' \cdot R_1 = 2\ N$

$i_3' = - i_{E_1}' \frac{R_{eq}}{R_2 + R_A} \frac{R_1}{R_1 + R_A} = -\frac{1}{2}\ A$

Lascio acceso E_2



La corrente è le stesse in tutto il circuito

$$R_A = R_1 // \frac{R_2 R_1}{R_2 + R_1} = 1\ \Omega$$

$$R_B = R_A + R_3 = 3\ \Omega$$

$$R_e = R_{ep} = R_B + R_H = 5\ \Omega$$

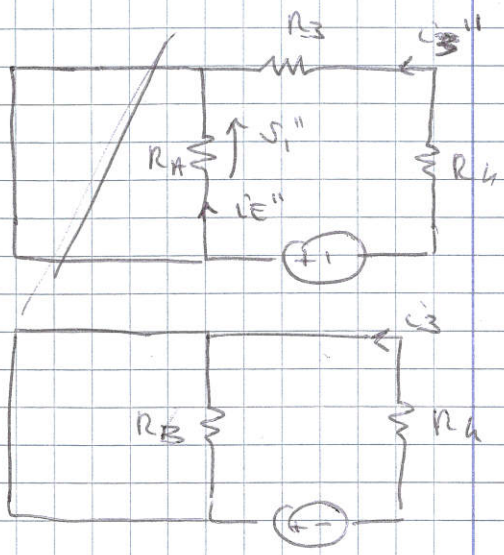
$$i_E'' = \frac{E_2}{R_{ep}} = \frac{2}{5}\ A$$

$$J_1'' = -i_E'' \cdot R_A = -0.4\ V$$

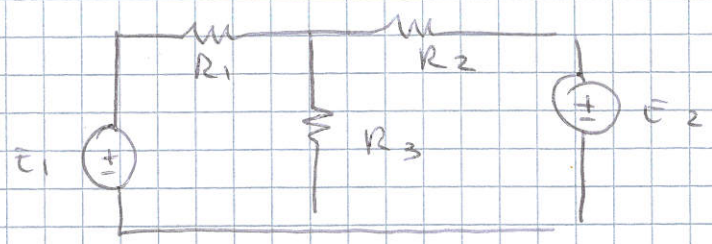
$$i_3'' = -i_E'' = -0.4\ V$$

$$i_3 = i_3' + i_3'' = -0.5 - 0.4 = -0.9\ A \quad \checkmark$$

$$J_1 = J_1' + J_1'' = 2 - 0.4 = 1.6\ V \quad \checkmark$$



Es 3.6 Determinare la potenza erogata dal generatore E_1



$E_1 = 5\ V$

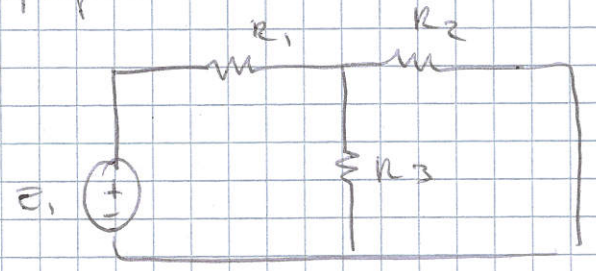
$E_2 = 12\ V$

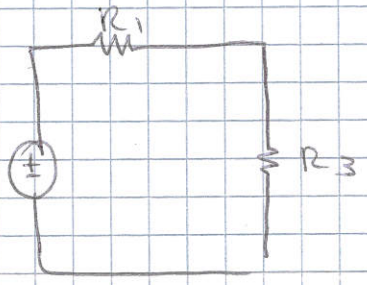
$R_1 = 3.5\ \Omega$

$R_2 = 2.3\ \Omega$

$R_3 = 3.2\ \Omega$

Spengo E_2



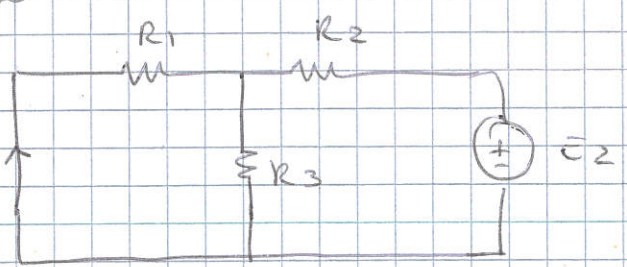


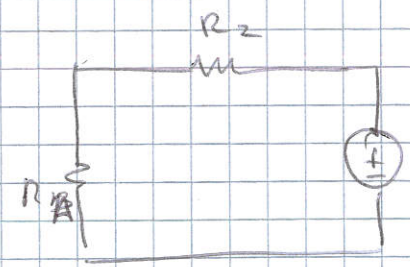
$$R_A = \frac{R_2 R_3}{R_2 + R_3} = 1.338\ \Omega$$

$$R_B = R_{eq} = R_1 + R_3 = 4.83\ \Omega$$

$$i_{E_1}' = \frac{E_1}{R_B} = 1.035\ A$$

Spengo E_1





$$R_A = \frac{R_1 R_3}{R_1 + R_3} = 1.67\ \Omega$$

$$R_B = R_{eq} = R_A + R_2 = 3.97\ \Omega$$

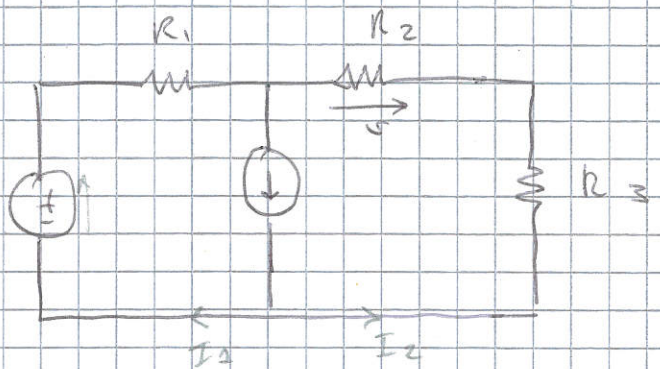
$$i_E'' = -\frac{E_2}{R_B} = 3.022\ A$$

$i\mathcal{E}_1'' = i\mathcal{E}_2'' \frac{R_3}{R_3+R_1} = @ -1.44\ A$

$i\mathcal{E}_1^* = i\mathcal{E}_1' + i\mathcal{E}_1'' = -0.405\ A$

$P_{erog\,\mathcal{E}_2} = -2.025\ W$

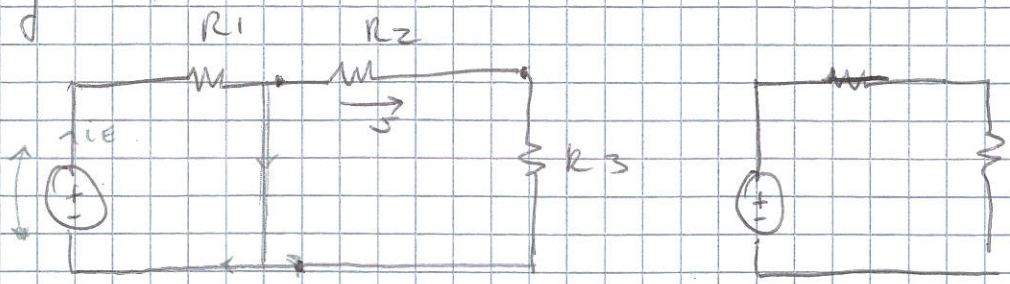
Es 3.7 Utilizzando il principio di sovrapposizione degli effetti, determinare la tensione v



$\mathcal{E} = 5V \quad \wedge \quad J = 2mA$

$R_1 = 3\,k\Omega \quad (3\cdot 10^{+3}) \qquad R_2 = 2.4\,k\Omega \quad (10^3) \qquad R_3 = 3.2\,k\Omega \quad (10^3)$

Spengo J



$R_A = \frac{R_2 R_3}{R_2+R_3} = 1.371\ \Omega$

$R_B = R_{eq} = R_A + R_1 = 4.371\ \Omega$

$i\mathcal{E}' = \frac{\mathcal{E}}{R_B} = 1.14\ A$