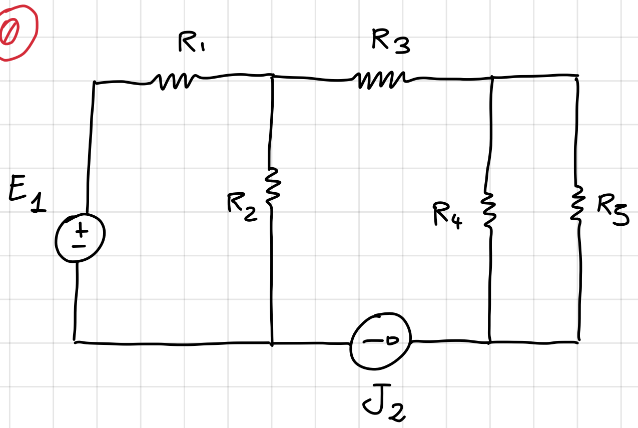
0




DATI

$E_1 = 20\,V$

$J_2 = 1.2\,A$

A $R_1 = 10\,\Omega$

B $R_2 = 20\,\Omega$

C $R_3 = 12\,\Omega$

D $R_4 = 30\,\Omega$

E $R_5 = 30\,\Omega$

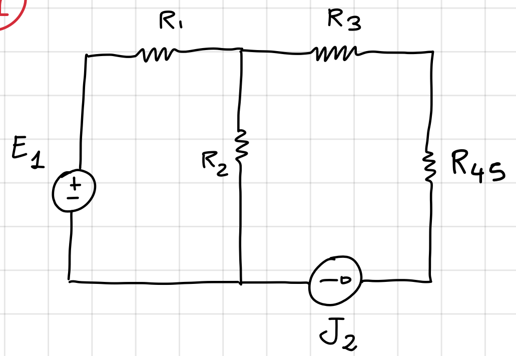
$Q_1$: $P^e_{E_0} = ?$ $P^e_{J_2} = ?$

$Q_2$: $P^a_{R_2} = ?$

$Q_3$: $J_2 \,/\, P^e_{E_1} < 0$

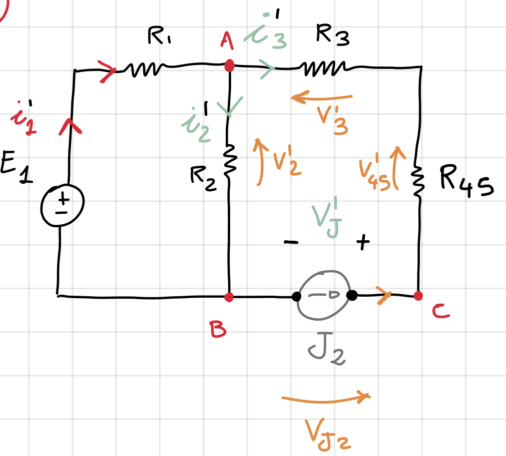
$\rightarrow R_{45} = R_4 // R_5 = 15\,\Omega$ $R_{45}$

1




2

C'




$R'_{eq} = R_1 + R_2 = 30\,\Omega$

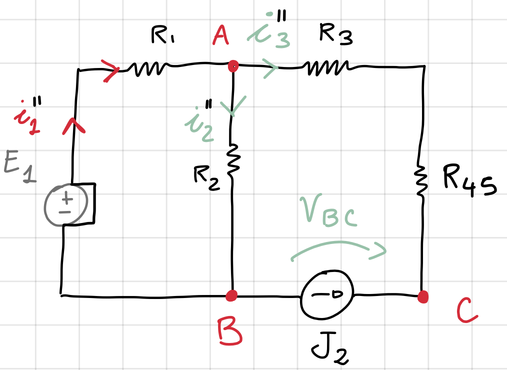
$\Rightarrow V = R \cdot I \rightarrow i'_1 = \dfrac{E}{R'_{eq}} = \dfrac{20}{30} = 0.67\,A$ $i'_1, i'_2$

$i'_1 = i'_2 = 0.67\,A$ $\qquad i'_3 = 0\,A$

$\rightarrow V'_J - V'_2 + V'_3 + V'_{45} = 0 \rightarrow V'_J = V_2 - \cancel{V_3}^{\,0} - \cancel{V_{45}}^{\,0}$

$\Rightarrow V'_J = V'_2 \rightarrow V'_J = i'_2 \cdot R_2 = 13.33\,V$ $V_J$

C''




$R''_{AB} = (R_1 // R_2) + R_3 + R_{45} = 33.67\,\Omega$

$V''_{BC}$

$\Rightarrow V = RI \rightarrow V_{BC} = R''_{AB} \cdot J_2 = 40.4\,V$

$J_2 = -i''_3 \Rightarrow i''_3 = -1.2\,A$ $i''_3$

$i''_1 = i''_3 \cdot \dfrac{R_2}{R_2 + R_1} = -0.8\,A$ $i''_1$

$i''_2$

$\Rightarrow LKC_A$: $i''_3 + i''_2 - i'_1 = 0 \rightarrow i''_2 = i''_1 - i''_3 = i''_1 + j = -0.8 + 1.2 = 0.4\,A$

TIRIAMO LE SOMME

$\rightarrow i_1 = i_1'' + i_1' = 0.67\,A - 0.8\,A = -0.13\,A$ $i_1$

$i_2 = 0.4 + 0.67 = 1.07\,A$ $i_2$

$V_{BC} = 40.4 + 13.33 = 53.73\,V$

CALCOLO DELLE POTENZE

$\rightarrow P_{R_2} = i_2^2 \cdot R_2 = 22.9\,W$ $P^a_{R_2}$

$P^e_{E_1} = E_1 \cdot i_1 = 20 \cdot (-0.13) = -2.6\,W$ $P^e_{E_1}$ $\rightarrow$ ASSORBE 2.6 W

$P^e_{J_2} = J_2 \cdot V_{BC} = 53.73 \cdot 1.2\,A = 64.48\,W$ EROGA

$P^e_{J_2}$

Affinché $J_2 \,/\, P^e_{E_1} < 0 \rightarrow i_1 = i_1' + i_1'' > 0$

Dipende da $J_2$

$$\Rightarrow \underbrace{i_3'' \cdot \frac{R_2}{R_2 + R_1}}_{i_1''} + \overbrace{\frac{E_0}{R_1 + R_2}}^{i_1'} > 0 \rightarrow -J_2 \frac{R_2}{R_2 + R_1} + \frac{E_0}{R_1 + R_2} > 0$$

Ans 3

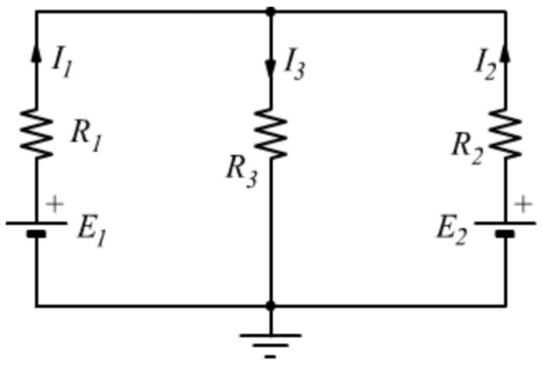
$$\rightarrow \frac{E_0 - J_2 R_2}{R_1 + R_2}$$

$N: E_0 - J_2 R_2 > 0 \rightarrow J_2 > \frac{E_0}{R_2} \rightarrow J_2 \geqslant 1\,A$

D: $> 0$ SEMPRE

**Esercizio 1**

Utilizzando il p.s.e.trovare la corrente $I_3$




$E_1$=11V

$E_2$=7V

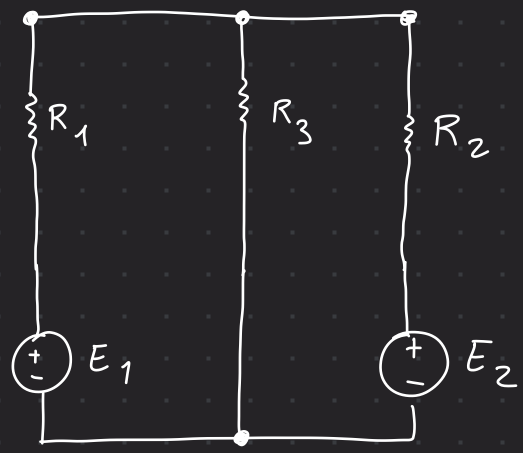
$R_1$=2Ω

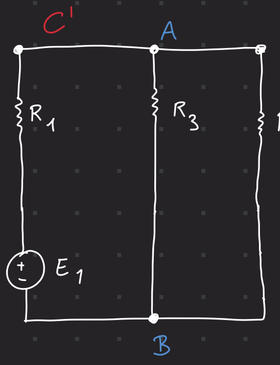
$R_2$=1Ω

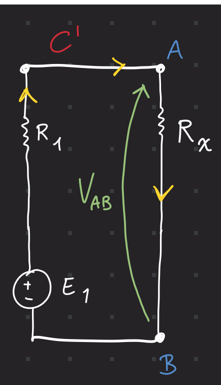
$R_3$=1Ω

$I_3$=?

[$I_3$=5A]



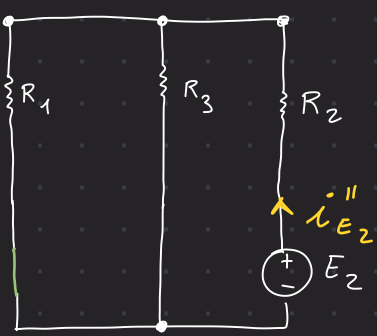

• Trovo $i_{E_1}$

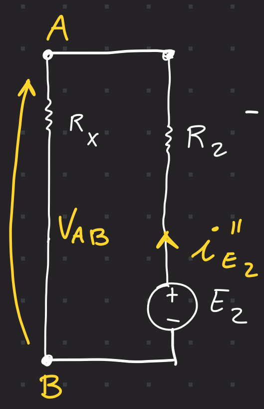
$$R_{EQ} = (R_3 \parallel R_2) + R_1 = 2.5\,\Omega$$

$$\rightarrow i_{E_1} = \frac{E_1}{R_{EQ}} = 4.4A$$

$$i_3' = i_{E_1}' \cdot \frac{R_2}{R_3+R_2} = 2.2\,A$$

$$V_{AB} = i_{E_1} \cdot R_x = 4.4 \cdot \frac{1}{2} = 2.2\,V$$




• Trovo $i_{E_2}$

$$\rightarrow R_{EQ} = (R_1 \parallel R_3) + R_2 = \frac{5}{3}\,\Omega$$

$$\rightarrow i_{E_2} = \frac{E_2}{R_{EQ}} = 4.2\,A$$

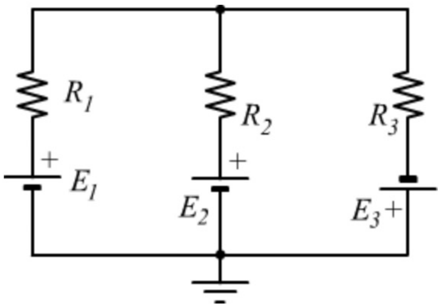
$$\rightarrow i_3 = i_{E_2}' \cdot \frac{R_1}{R_1+R_3} = 2.8$$

$$\Rightarrow I = i_{E_1}' + i_{E_2}'' = 2.2 + 2.8 = 5\,A \quad i_3$$

$$V = v_{AB}' + v_{AB}'' = 2.8 + 2.2 = 5\,V$$

**Esercizio 2**

Utilizzando il p.s.e.trovare la corrente $I_3$




$E_1$=10V

$E_2$=7V

$E_3$=7V

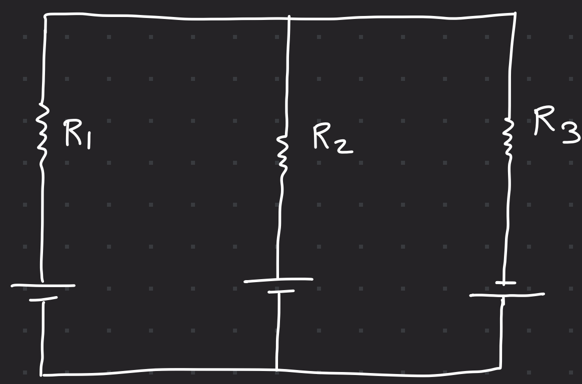
$R_1$=2Ω

$R_2$=1Ω

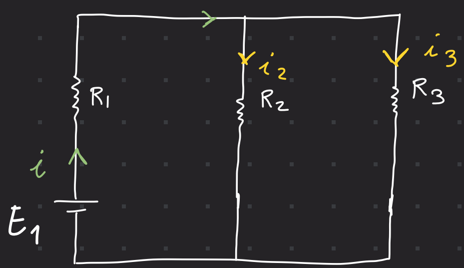
$R_3$=1Ω

$I_3$=?

[$I_3$=9A]




C'

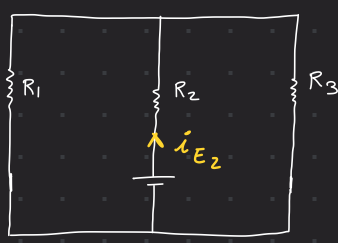


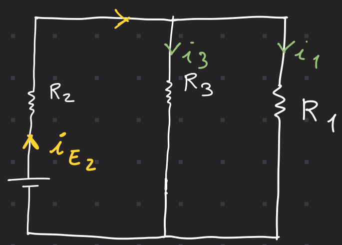

• Trovo $i_{E_1}$ $\rightarrow$ $R_{eq} = (R_2 // R_3) + R_1 = \frac{5}{2} = 2.5\,\Omega$

$\rightarrow i_{E_1} = \frac{E_1}{R_{eq}} = 4\,A$

$i'_3 = i \cdot \frac{R_2}{R_2+R_3} = 2\,A$

C''

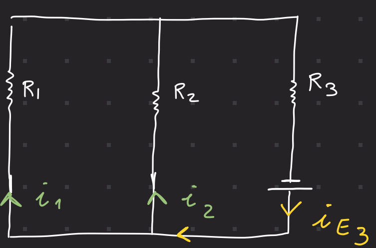



$i_{E_2} = \frac{E_2}{R_{EQ}} = 4.2\,A$

$\rightarrow i''_3 = i_{E_2} \cdot \frac{R_1}{R_3+R_1} = 2.8\,A$

C'''



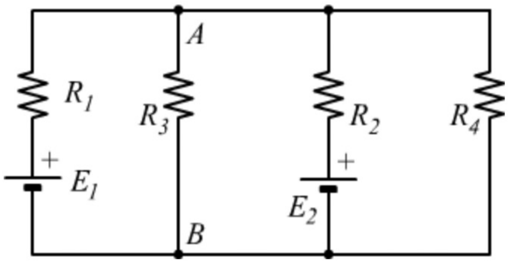

$i'''_{E_3} = \frac{E_3}{R_{EQ}} = 4.2\,A$

Time 13'

$\Rightarrow I_3 = i'_3 + i''_3 + i'''_3 = 4.2 + 2.8 + 2 = 9A$ Ans

**Esercizio 3**

Utilizzando il p.s.e.trovare la corrente $I_3$



$R_1=R_3=1\Omega$

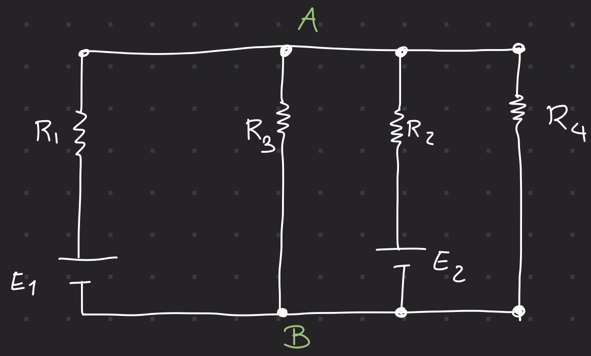
$R_2=R_4=2\Omega$

$E_1=6V$

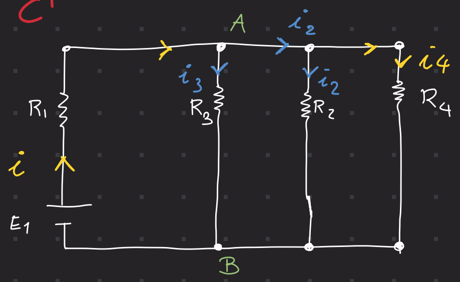
$E_2=3V$

$I_3=?$

$[I_3=2,5A]$



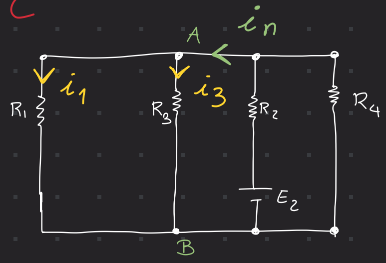
C'



$$R_x = R_2 \parallel R_4 = 1\,\Omega \quad \rightarrow \quad i_3 = i_E \cdot \frac{R_x}{R_3 + R_x}$$

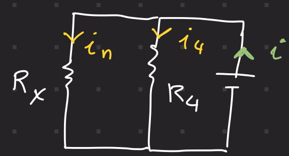
$$\rightarrow \quad i_3' = \frac{E_1}{[(R_2 \parallel R_4) \parallel R_3] + R_1} \cdot \frac{1}{2} = 2\,A$$

C''



$$i''_{E_2} = \frac{E_2}{R_{Eq}} = 1.25\,A \qquad \text{con} \qquad R_{eq} = [(R_1 \parallel R_3) \parallel R_4] + R_2 = 2.4\,\Omega$$

$$\Rightarrow \quad R_x = R_1 \parallel R_3 = \frac{1}{2}\,\Omega$$



$$\rightarrow \quad i_n = i''_E \cdot \frac{R_4}{R_x + R_4} = 1\,A$$

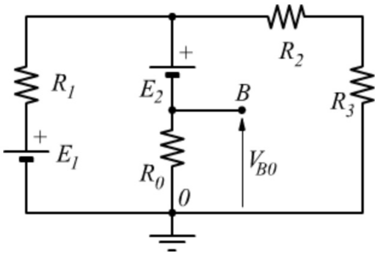
$$\Rightarrow \quad i_3 = i_n \cdot \frac{R_1}{R_1 + R_3} = \frac{1}{2}\,A$$

Time ~25'

$$\Rightarrow \quad i_3 = i_3' + i_3'' = \frac{1}{2} + 2 = 2.5\,A$$ Ans

**Esercizio 4**

Utilizzando il principio di sovrapposizione degli effetti, determinare il valore della caduta di tensione ai capi di $R_0$




$E_1$=20V

$E_2$=3,2V

$R_1$=12KΩ

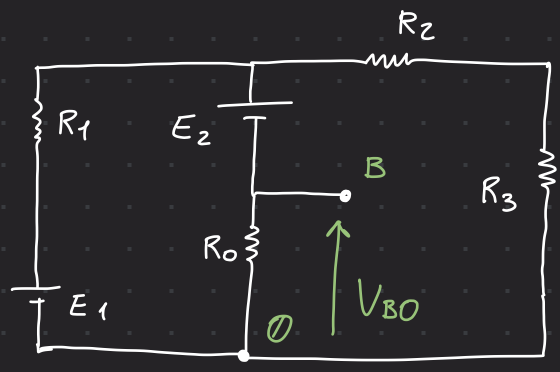
$R_0$=2,88KΩ

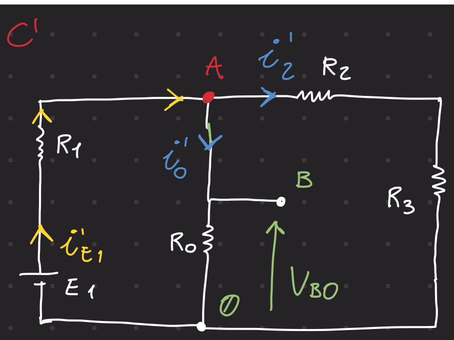
$R_2$=18KΩ

$R_3$=20KΩ

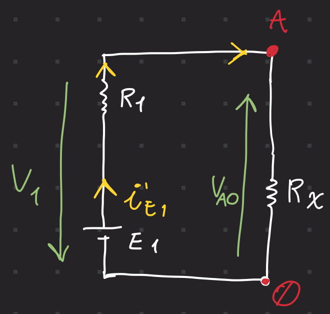
$V_{BO}$=?

[Risp.:$V_{BO}$=2,88 V]



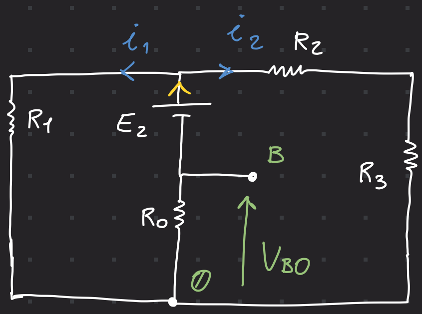

$V_{BO} = V_{AO} \Rightarrow$ Circuito eq

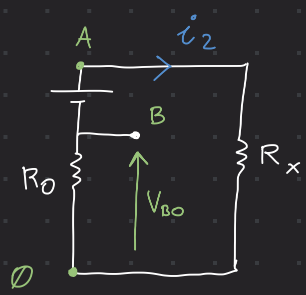



$$R_x = (R_2+R_3) \parallel R_0 \overset{!}{=} 2677.1\ \Omega \overset{!}{=} 2.67\ k\Omega$$

Partitore di Tensione

$$V'_{AO} = V_1 \cdot \frac{R_x}{R_x + R_1} = 20V \cdot \frac{2.67 \cancel{\times 10^3}}{(2.67+12)\cancel{\times 10^3}} = 3.64\ V$$




$$R_x = (R_2+R_3) \parallel R_1 \overset{!}{=} 9.12\ \Omega$$

$$i''_{E_2} = \frac{E_2}{R_{eq}} = \frac{E_2}{R_x + R_0} = 0.267A$$

non so che fine abbiamo fatto i KΩ...

$$\Rightarrow V_{BO} = R_0 \cdot i_2 = 0.768\ V = -V''_{OB}$$