Resistori in serie

$$R_{eq} = R_1 + \cdots + R_n$$

Resistori in parallelo

$$\frac{1}{R_{eq}} = \frac{1}{R_1} + \cdots + \frac{1}{R_n}$$

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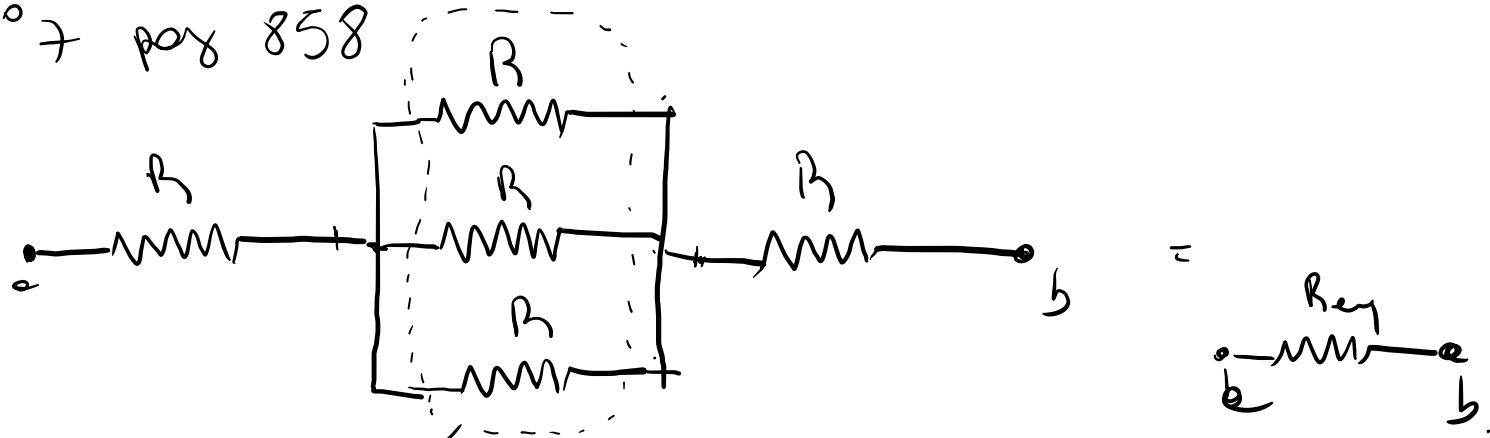

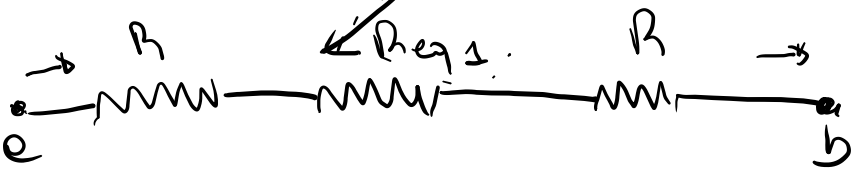

$$\frac{1}{R_{eq_1}} = \frac{1}{R} + \frac{1}{R} + \frac{1}{R} = \frac{1}{R_{eq_1}} = \frac{3}{R} \Rightarrow R_{eq_1} = \frac{R}{3}$$

$$R_{eq_{TOT}} = R + \frac{R}{3} + R = \frac{7}{3}R$$

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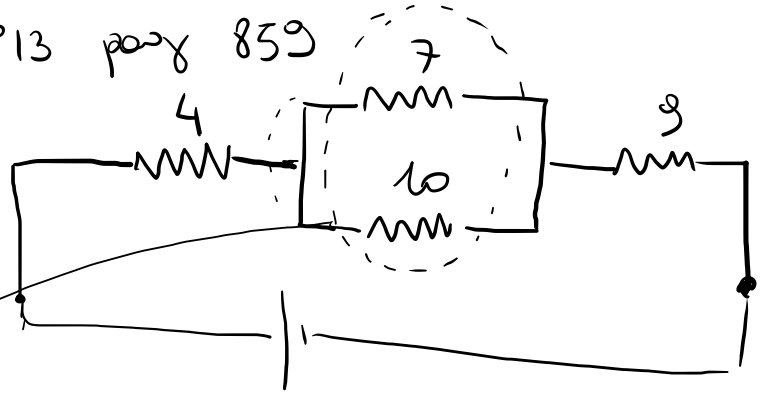
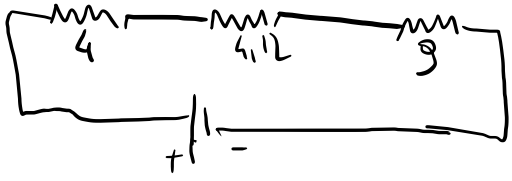


$R_{eq\,TOT}$

de $\Delta V = 34\,V$

I du circuit restante

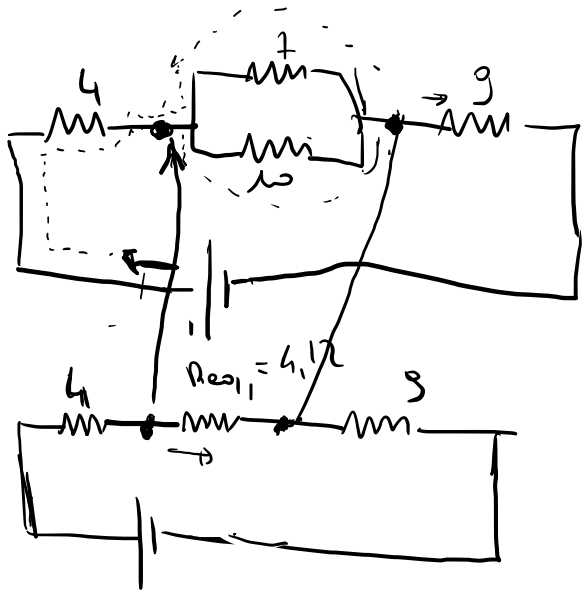
$$\frac{1}{R_{eq\,1}} = \frac{1}{7} + \frac{1}{10} \Rightarrow R_{eq\,1} = \frac{70}{17} = 4{,}12\,\Omega$$



$$R_{eq\,TOT} = 4 + 4{,}12 + 9 = 17{,}12\,\Omega$$

$\Delta V = I \cdot R$

$I = \frac{\Delta V}{R} = \frac{34}{17,1} \sim 1,99\,A$



Sul resistore da 4 e 9 Ω passa lo stesso $I = 1,99\,A$

$\Delta V = I \cdot R_{eq1} = 1,99 \cdot 4,12 = 8,18\,V$

Sulle resistenze da 7 Ω $\quad 8,18 = I \cdot 7 \quad I = \frac{8,18}{7} = 1,17\,A$

10 Ω $\quad 8,18 = I \cdot 10 \rightarrow$

$I_{tot} = I_1 + I_2$ $\quad (1,99 - 1,17 = 0,818\,A)$

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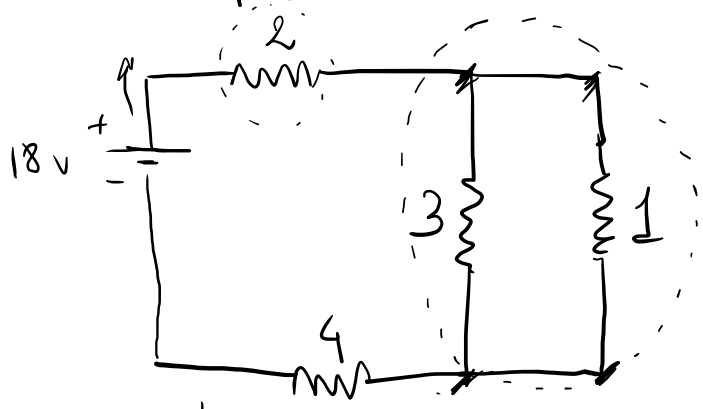
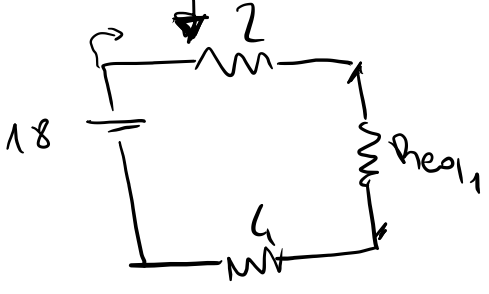


Potenza dissipata sul circuito resistore = ?



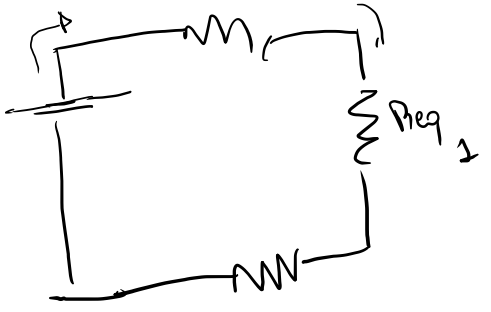
$$\Rightarrow \frac{1}{R_{eq_1}} = \frac{1}{1} + \frac{1}{3} \rightarrow R_{eq} = \frac{3}{4} = 0{,}75\,\Omega$$

$$R_{eq_{1\,TOT}} = 2 + 4 + 0{,}75 = 6{,}75\,\Omega$$

$$I = \frac{18}{6,75} = 2,67\ A$$

$$P_{(2\Omega)} = I^2 R = (2,67)^2 \cdot 2 = 14,2\ W$$

$$P_{(4\Omega)} = I^2 \cdot R = (2,67)^2 \cdot 4 = 28,4\ W$$



$$\Delta V = I \cdot R_{eq\,1} = 2,67 \cdot 0,75 = 2V$$

$$I_3 = \frac{\Delta V}{R_3} = \frac{2}{3} = 0,667A$$

$$P_3 = (0,667)^2 \cdot 3 = 1,33\ W$$

$$I_1 = \frac{2}{1} = 2A$$

$$I_{TOT} = 2,67\ A$$

$$I_2 = I_{TOT} - I_1 = 2,67 - 0,67 = 2A$$

$$P_{2\Omega} = 4 \cdot 1 = 4\ W$$

- Carica e scarica di un condensatore in un circuito RC

$\tau = RC$

- CARICA

$$q(t) = Q \cdot (1 - e^{-t/\tau}) \qquad Q = \mathcal{E} \cdot C$$

$i = \frac{dq}{dt}$ $\quad i(t) = \frac{\mathcal{E}}{R} e^{-t/\tau}$

- scarica

$$q(t) = Q_i e^{-t/\tau}$$

$$i(t) = -\frac{Q_i}{\tau} e^{-t/\tau}$$

$\frac{Q_i}{\tau}$ → [corrente] $= I_i$

corrente iniziale nel circuito.

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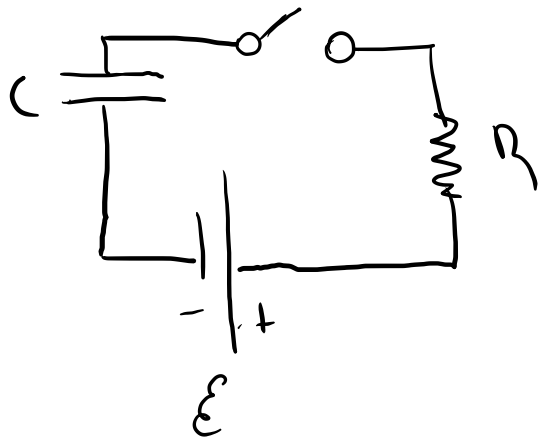

$R = 1\,M\Omega$

$C = 5\,\mu F$

$\mathcal{E} = 30\,V$

1- $\tau = ?$

2- $Q = ?$ carica massima su C

3- $i(t)$ dopo $t = 10\,s$

$$\tau = RC = 1 \cdot 10^{6} \cdot 5 \cdot 10^{-6} = 5\,s$$

$$Q = C\Delta V = C\mathcal{E} = 5 \cdot 10^{-6} \cdot 30 = 150 \cdot 10^{-6}\,C$$

$$i(t) = \frac{\mathcal{E}}{R} e^{-t/\tau} = \left(\frac{30}{10^{6}}\right) \exp(-10/5)$$

$$= 30 \cdot 10^{-6} \cdot 0{,}135 = 4{,}06 \cdot 10^{-6}\,A$$

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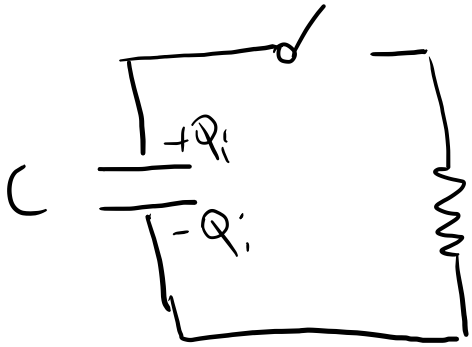

$\tau = 1{,}5\ s$

- dopo quale tempo t dalla chiusura del circuito la carica su C è 75%
- se $R = 250\ k\Omega$ quale valore C

$q(t) = Q_i e^{-t/\tau}$

$q(t) = 0{,}75\, Q_i$ $\rightarrow$ $0{,}75 \cancel{Q_i} = \cancel{Q_i} e^{-t/\tau}$

$e^{-t/\tau} = 0{,}75$ $\quad -t/\tau = \ln(0{,}75)$

$t = -\tau \ln(0{,}75)$

$= -1{,}5 \ln(0{,}75) = 0{,}432\ s$

C x R = 250 kΩ

$\tau = 1{,}5\ s$

$\tau = RC$

$$C = \frac{\tau}{R} = \frac{1{,}5}{250 \cdot 10^{3}} = 6 \cdot 10^{-6}\ F = 6\ \mu F$$