(10.73).

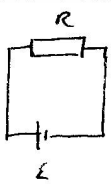
Puissance dissipée $= Ri^2$

1). avec R_{int} :

$U_0 = \mathcal{E} - R_{int} i_0 = R i_0$

$\Rightarrow i_0 = \dfrac{\mathcal{E}}{R + R_{int}}$

2). Sans R_{int} :



$U = \mathcal{E} = R i$

$\Rightarrow i = \dfrac{\mathcal{E}}{R}$

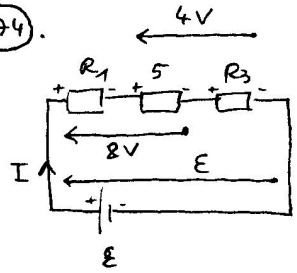
$$R i_0^2 = 0,9\, R i^2$$

$$\frac{i_0}{i} = \sqrt{0,9} = \frac{\mathcal{E}}{R + R_{int}} \cdot \frac{R}{\mathcal{E}}$$

$\Rightarrow \sqrt{0,9}\,(R + R_{int}) = R \quad \Rightarrow \left(\sqrt{0,9} - 1\right) R = -\sqrt{0,9} \cdot R_{int}$

$$\Rightarrow \frac{R_{int}}{R} = \frac{\sqrt{0,9} - 1}{-\sqrt{0,9}} \simeq \frac{1 - \sqrt{\frac{9}{10}}}{\sqrt{\frac{9}{10}}} = \frac{1 - \frac{3}{\sqrt{10}}}{3 \cdot \frac{1}{\sqrt{10}}} = \frac{\sqrt{10} - 3}{3} = \frac{\sqrt{10}}{3} - 1$$

(10.74).



$$\begin{cases} R_1 + R_3 = 17 & (1) \\ (R_1 + 5) \cdot I = 8 & (2) \\ (R_3 + 5) \cdot I = 4 & (3) \\ \mathcal{E} = R_{Tot} \cdot I = 22 I & (4) \end{cases}$$

(Lois d'Ohm et de Kirchhoff)

de (1) : $R_1 = 17 - R_3$ $\Rightarrow$ $\begin{cases} (22 - R_3) \cdot I = 8 & (2') \\ (R_3 + 5) \cdot I = 4 & (3') \end{cases}$ $\Rightarrow I = \dfrac{8}{22 - R_3}$ ← dans (2')

$$\Rightarrow (R_3 + 5) \cdot \frac{8}{22 - R_3} = 4 \quad \Rightarrow \quad 2(R_3 + 5) = 22 - R_3 \quad \Rightarrow \quad 2R_3 + 10 = 22 - R_3 \quad \Rightarrow \quad 3R_3 = 12$$

$$\Rightarrow R_3 = 4\,\Omega$$

$$\Rightarrow R_1 = 13\,\Omega$$

Tension aux bornes de la batterie : $I = \dfrac{8}{22 - 4} = \dfrac{8}{18} = \dfrac{4}{9}$

$$\Rightarrow \mathcal{E} = 22 \cdot \frac{4}{9} = \frac{88}{9} \simeq 9,8\,V$$