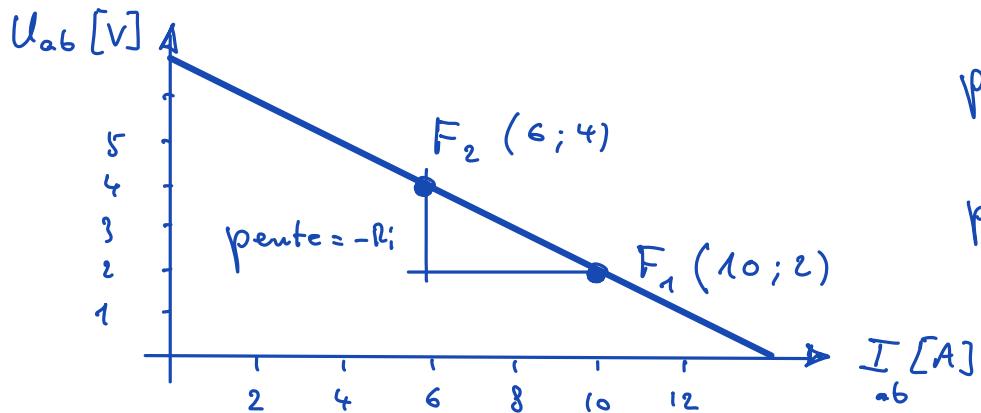


Question 1 - QCN - Corrigé

• Question 1 - I (points de fonctionnement)

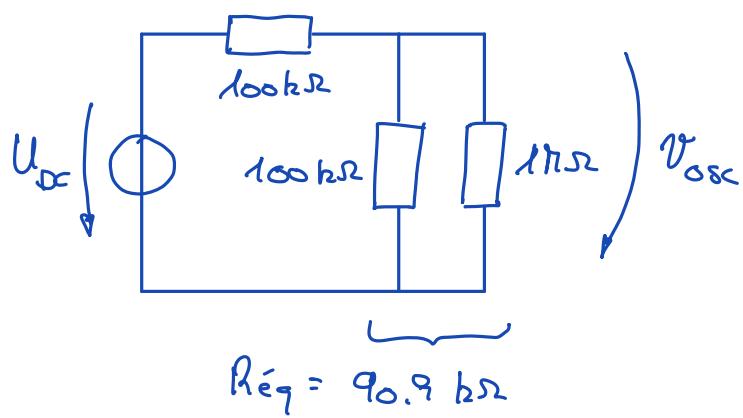


$$\text{pente} = \frac{2-4}{10-6} = -\frac{2}{4}$$

$$\text{pente} = -R_i = -0.5$$

$$R_i = 0.5 \Omega \quad (\text{c})$$

• Question 1 - II (point diviseur)



C_{in} n'intervient pas (DC)

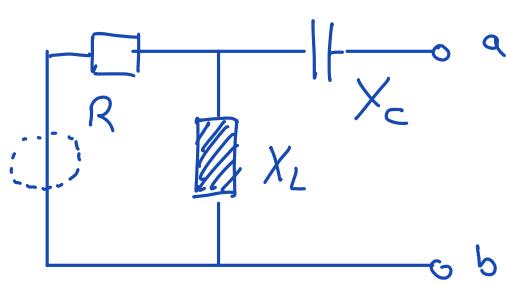
$$\frac{U_{oc}}{R + R \parallel R_{in}} = \frac{V_{osc}}{R \parallel R_{in}}$$

$$V_{osc} = \frac{U_{oc} \cdot R_{\text{éq}}}{R + R_{\text{éq}}} = 5.71 \text{ V}$$

$$U_{osc} = 5.71 \text{ V} \quad (\text{d})$$

• Question 1 - III (impédance interne)

Impédance vue de ab lorsque l'on supprime toutes les sources : $\underline{Z}_{in} : (R \parallel X_L) \text{ série } X_C$



$$\begin{aligned}\underline{Z}_{in} &= \frac{1}{\frac{1}{R} + \frac{1}{jX_L}} + jX_C = \frac{1}{\frac{1}{2} - j\frac{1}{4}} - j0.4 \\ &= \frac{4}{2-j} - j\frac{2}{5} = \frac{8+4j}{4+1} - j\frac{2}{5} = \underline{\underline{\frac{8}{5} + j\frac{2}{5}}}\end{aligned}$$

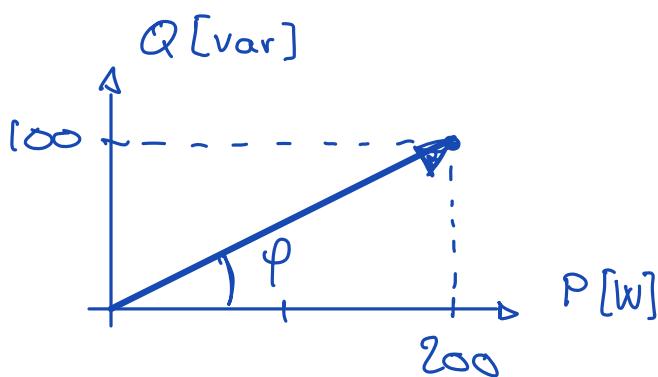
$$R = 2\Omega ;$$

$$X_L = 4\Omega ; X_C = -0.4\Omega .$$

(b)

• Question 1 - IV (puissances)

$$\underline{S}_{tot} = P_{tot} + jQ_{tot} = R_{eq} \cdot \underline{I}^2 + jX_{eq} \cdot \underline{I}^2$$



$$= 100 + 100 + j(150 - 50)$$

$$R_{eq} = \frac{P_{tot}}{\underline{I}^2} = \frac{200}{100} = 2 \Omega$$

$$X_{eq} = \frac{Q_{tot}}{\underline{I}^2} = \frac{100}{100} = 1 \Omega$$

$$\Rightarrow \underline{Z}_{eq} = 2 + j = 2.235 \cdot e^{j26.57^\circ} \Omega$$

(a)

• Question 1 - V (puissances)

$$\underline{S}_s = (P_1 + P_2) + j(Q_1 + Q_2) \quad ; \quad S_s = U_s \cdot I_s$$

? ✓ ? ? ✓ ✓ ? ?

Connaitre S_s , U_s ou I_s n'est pas suffisant.

Il faut connaître \underline{S}_s

Solution (b)

• Question 1 - VI (résonance)

$$\text{À la résonance: } \omega_0 L = \frac{1}{\omega_0 C} \Rightarrow \omega_0^2 = \frac{1}{LC}$$

$$\text{À } \omega_1: j\omega_1 L = -3 \frac{1}{j\omega_1 C} \Rightarrow \omega_1^2 = \frac{3}{LC} = 3 \omega_0^2$$

$$\Rightarrow \omega_0 = \frac{1}{\sqrt{3}} \cdot \omega_1$$

Solution (b)

Résumé:

I : (c)

IV : (a)

II : (d)

V : (b)

III : (b)

VI : (b)