Correction Colle n°1

1.a) On a $\underline{V} = (R + jX)\,\underline{I}$

d'où $\underline{I} = \dfrac{\underline{V}}{R+jX} = \dfrac{230}{30+10j}$

$$\underline{I} = \frac{230 \times (30 - 10j)}{30^2 + 10^2}$$

$$\underline{I} = 6{,}9 - 2{,}3\,j$$

b) $$\underline{I} = \sqrt{6{,}9^2 + 2{,}3^2}\; e^{j \times \arctan\left(\frac{-2{,}3}{6{,}9}\right)}$$

$$\underline{I} = 7{,}27\, e^{-j \times 18{,}4°}$$

2. $I = |\underline{I}| = 7{,}27$ A

3. $i = I\sqrt{2}\,\sin(\omega t - \varphi) = 10{,}3 \times \sin(\omega t - 18{,}4°)$

4. On a $\underline{V_R} = R \times \underline{I} = 218{,}1\, e^{-j \times 18{,}4°}$

et $\underline{V_L} = jL\omega\,\underline{I} = e^{j \times 90°} \times L\omega \times 7{,}27\, e^{-j \times 18{,}4°}$

$$\underline{V_L} = 72{,}7\, e^{j \times 71{,}6°}$$

5.a) (R) $P_R = R\,I^2 = 30 \times 7{,}27^2 = 1586$ W

$Q_R = 0$ VAR

b) (L) $P_L = 0$ W

$Q_L = L\omega\,I^2 = 10 \times 7{,}27^2 = 528{,}5$ VAR

c) $P_{tot} = P_R + P_L = 1586$ W $\qquad Q_{tot} = Q_R + Q_L = 528{,}5$ VAR