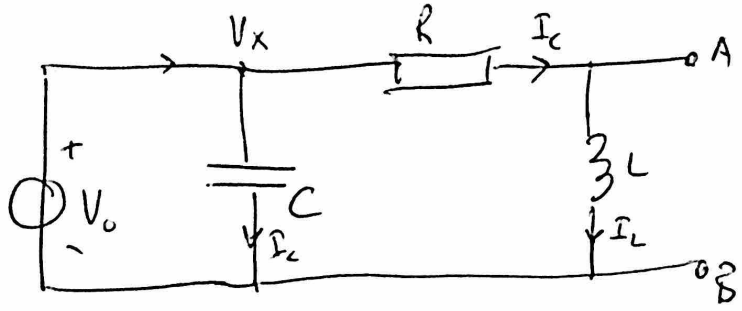
PROBLEM 2.

$V_0 = 5\cos(\omega t + 30^\circ)\,V$

$R = 100\ \Omega$

$C = 10\ nF$

$L = 100\ \mu H$



$$\frac{V_c}{k} = \frac{V_0 - V_x}{R} \Rightarrow V_x \cdot R = (V_0 - V_x) I_c \Rightarrow V_0 \cdot R = V_x \cdot I_c - V_0 \cdot I_c$$

$$V_0 \cdot I_c - V_0 I_c = V_0 \cdot I_c \Rightarrow V_x = \frac{-V_0 \cdot I_c}{R \cdot I_c} = V_0 \cdot I_c$$

$$= 100 \angle 90^\circ \qquad V_c = 5 \angle 30^\circ$$

$$V_x = \frac{V_0 \cdot I_c}{R + I_c} = \frac{600 \angle 90^\circ)(5 \angle 30^\circ)}{-10 c + (100 \angle 120^\circ)} = \frac{500 \angle 120^\circ}{100 + 100 \angle 90^\circ}$$

$$COS(120) = -\frac{1}{2} \qquad SIN(120) = \frac{\sqrt{2}}{2} \Rightarrow 500 \angle -\frac{1}{2} + \frac{\sqrt{2}}{2} = \angle 50c \cdot 30\sqrt{3}$$

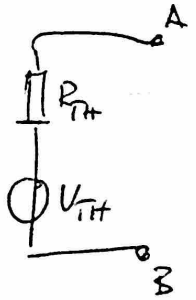
$$V_{TH} = \frac{-\angle 500 \angle 50\sqrt{3}}{-100 \angle 300 \angle 90^\circ)} = \frac{(-5 + 5 \cdot \sqrt{3})}{(-2 + 2)(} = \frac{-10 \cdot 10j \cdot 10j\sqrt{3} \cdot 10\sqrt{3}}{3}$$

$$\Rightarrow 0{,}92 - 3{,}42j = V_{TH}$$

$$V_{TH} = A\cos(\omega t + V^\circ) \qquad A = \sqrt{0{,}92^2 + (-3{,}42)} = 3{,}59 \qquad V^\circ = \frac{3{,}92}{0{,}12} = 95^\circ$$

$$V_{TH} = 3{,}52\cos(10^\circ + 95^\circ)$$

$$R_{TH} \Rightarrow R_{TH} = \frac{1}{\frac{1}{2c} \cdot \frac{1}{R}} = \frac{1}{\frac{R + 2c}{2 \cdot IR}} = \frac{2IR}{R + 2c} = \frac{j\omega t \cdot R}{R \cdot j\omega t} = \frac{10000j}{100j + 900}$$



$$R_{TH} = \frac{10\cos j}{1000j + 900}$$

$$U_{TH} = 3{,}92\cos(10^\circ t + 9i^\circ)$$