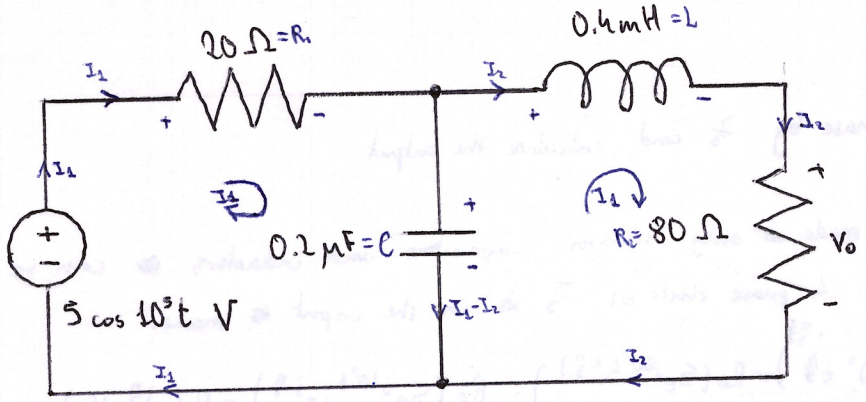
C.E 1.




1. Calculate the output $v_o(t)$

a) Indicate the procedure and the phasors you use

Procedure?: calculate the impedances of each component, then use Kirchoff's law of voltages to calculate $V_o$.

The phasor of input voltage $v_g = 5\cos 10^5 t$ ~~will be~~ $= \mathrm{Re}(5e^{j10^5 t})$ will be $V_g = 5e^{j10^5 t}$

b) Indicate the signs of voltages and currents

(See diagram)

c) Express the Kirchoff equations

~~$\sum \Delta V_c = 0$~~ ~~in loop~~

$$\sum_{k \in loop} \Delta V_k = 0 \quad ; \quad \sum_{k \in node} I_k = 0$$

d) Indicate the current phasor in the coil and it ~~see~~ signal in time.

$I_L = \frac{V_L}{Z_L} = I_2$ that is the phasor. I don't understand the rest of the question.

$$V_g(t) = V_{R_1} + V_C = I_1 R_1 + (I_1 - I_2) Z_C = (I_1, I_2) \cdot (R_1 + Z_C, -Z_C)$$

$$0 = -V_C + V_L + V_{R_2} = (I_2 - I_1) Z_C + I_2 Z_L + I_2 R_2 = (I_1, I_2) \cdot (-Z_C, Z_C + Z_L + R_2)$$

$$M \cdot I = V \quad \Rightarrow \begin{pmatrix} R_1 + Z_C & -Z_C \\ -Z_L & Z_C + Z_L + R_2 \end{pmatrix} \begin{pmatrix} I_1 \\ I_2 \end{pmatrix} = \begin{pmatrix} V_g \\ 0 \end{pmatrix} \Rightarrow I = M^{-1} V$$

Through the magic of Python, we get ~~$I = 5.392 \cdot 10^{-3} + 0.1$~~

$$I = \begin{pmatrix} (5.392 \cdot 10^{-3} + 4.902 \cdot 10^{-3} j)\, e^{j10^5 t} \\ (3.431 \cdot 10^{-3} + 2.941 \cdot 10^{-3} j)\, e^{j10^5 t} \end{pmatrix} \Rightarrow i_L = i_2 = \mathrm{Re}(I_2) = 4.519 \cdot 10^{-3} \cdot \cos(10^5 t - 0.7086)$$

$$\boxed{V_o(t) = 3.616 \cdot \cos(10^5 t - 0.7086)}$$