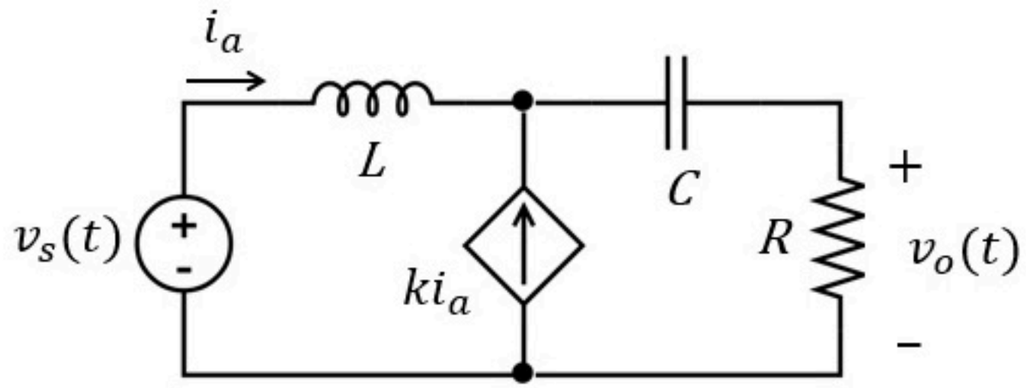
# Phasors 008

Unlimited Attempts.

$v_s(t) = A_1 \cdot \cos(1000t)$

Find steady state voltage

$v_o(t) = A_2\sqrt{2} \cdot \cos(1000t + B_2)$ with $-180° < B_2 \leq 180°$




Given Variables:

A1 : 5 V
L : 20 mH
C : 20 uF
R : 45 ohm
k : 3 A/A

Calculate the following:

A2 (V) :

2.5 ✓

B2 (degrees) :

45 ✓

Hint: Use nodal analysis or KVL/KCL.

$v_s(t) = A_1 \cdot \cos(1000t)$

A1 : 2 V

L : 150 mH

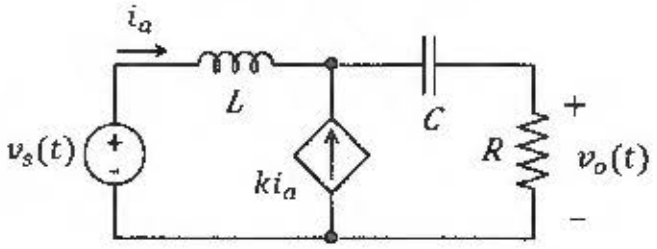
C : 20 uF

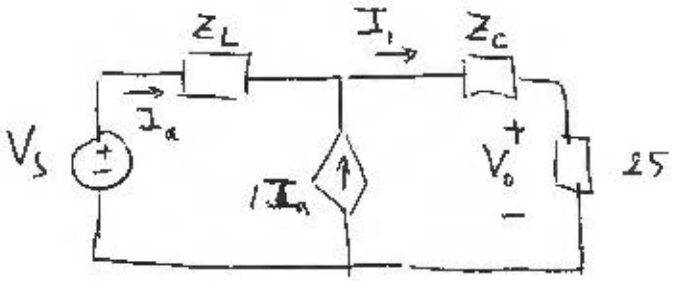
R : 25 ohm

k : 1 A/A

Find steady state voltage

$v_o(t) = A_2\sqrt{2} \cdot \cos(1000t + B_2)$ with $-180° < B_2 \leq 180°$




$I_1 = I_a + I_a = 2 I_a$

$Z_L = j\omega L = j150$

$Z_c = \frac{1}{j\omega C} = -j50$

$V_s = 2$

KVL: $V_s - I_a \cdot Z_L = I_1 (Z_c + 25) = 2 I_a (Z_c + 25)$

$\Rightarrow I_a = \frac{V_s}{Z_L + 2Z_c + 50} = \frac{V_s}{150j - 100j + 50} = \frac{V_s}{50 + 50j}$

$V_o = I_1 \cdot 25 = 2 I_a \cdot 25 = \frac{50 \cdot V_s}{50 + 50j} = \frac{2}{1 + j}$

$= \frac{2}{\sqrt{2}} e^{-j45°} = \sqrt{2}\, e^{-j45°}$

$v_o(t) = \sqrt{2} \cos(1000t - 45°)$

$A_2 = 1$ V

$B_2 = -45°$