ECE 35, Fall 2018

Quiz 3

/ 20

Last name

First + middle name(s)

PID

Instructions:

- Read each problem completely and thoroughly before beginning
- All calculations need to be done on these sheets
- Write your answers in the answer boxes for each question. Make sure you list units!
- Answers without supporting calculations will receive zero credit

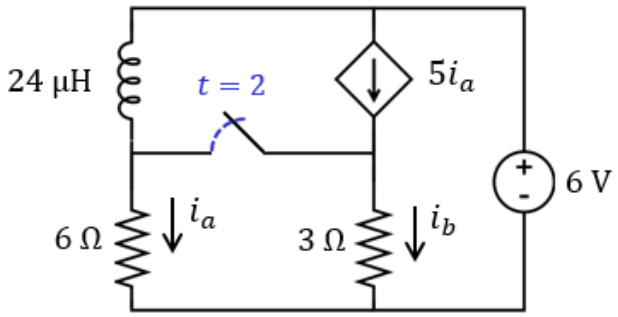
(1) For $t < 2$ s, the switch is closed and you may assume the system has reached steady state. The switch opens at time $t = 2$ s.

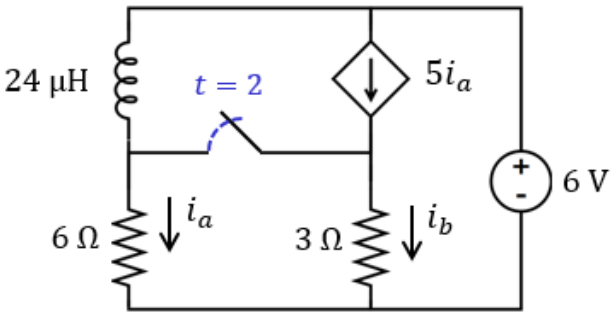
(a) Find $i_b(2^-)$. *(1 point)*

$i_b(2^-)$

(b) Find $i_b(t)$ for $t > 2$ s. *(6 points)*

$i_b(t)$

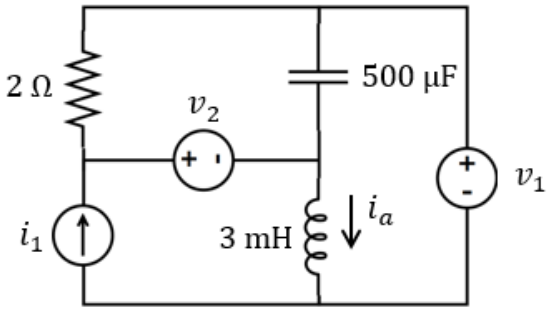




(2) For an RC system, we found $i_1(t) = -4 \cdot e^{-t/4\,s} + 1$ A. Draw this waveform. Indicate where you can find the time constant on the graph. *(2 points)*

(3) The system is in steady state. Find $i_a(t)$. (In your answer, combine cosines/sines with the same frequency. So for each frequency, there should be only one cosine wave.) *(6 points)*

$i_a(t)$



$i_1(t) = \sin(1000t)$ A

$v_1(t) = 2 \cdot \cos(1000t + \pi)$ V

$v_2(t) = 4$ V

(4) In the circuit below, the switch moves from position A to position B at time t = 0 s. For $t < 0$ s (switch in position *A*), you may assume the system is in steady state. The voltage source is sinusoidal with $\omega = 1000$. The diagram shows two phasors, **A** and **B** (not to scale). One of them represents the capacitor voltage and the other the resistor voltage (but you are not told which one is which). *(5 points)*

$i_R(0^-)$ ☐

$i_R(0^+)$ ☐

(a) Find i_R at time $t = 0^-$ (i.e. just before the switch moves to *B*).

(b) Find i_R at time $t = 0^+$ (i.e. immediately after the switch moves to *B*).