ECE 1270
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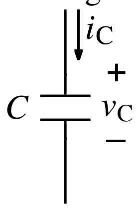
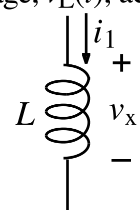
HOMEWORK #9

1. In (a)-(c), the voltage $v_C(t)$ across a 0.2 μF capacitor is listed. Find the current, $i_C(t)$, flowing in the capacitor in each case as a function of time:



a) $v_C(t) = 3$ V
b) $v_C(t) = 1000t$ V/s
c) $v_C(t) = 1 - e^{-t/4\text{ms}}$ V

2. In (a)-(c), the current $i_L(t)$ flowing into a 0.5 mH inductor is listed. Find the voltage, $v_L(t)$, across the inductor in each case as a function of time:



a) $i_L(t) = 5$ mA
b) $i_L(t) = 5t$ mA/s
c) $i_L(t) = 5\sin(2\pi \cdot 100t)$ mA

3. The following equation describes the voltage, v_C, across a capacitor as a function of time. Find the time, t, at which v_C is equal to 2 V.

$$v_C(t) = 1 + 3(1 - e^{-t/8\text{ms}})\text{ V}$$

4. The following equation describes the voltage, v_L, across an inductor as a function of time. Find an expression for the current, $i_L(t)$, through the inductor as a function of time. Assume that $i_L(t = 0) = 0$ A.

$$v_L(t) = 2 + 6(1 - e^{-t/12.5\mu\text{s}})\text{ kV}$$

5. Find the voltage, v_C, on the capacitor in the circuit below as a function of time if $v_C(t = 0) = 2.4$ V.