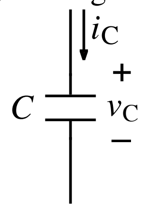
ECE 1270
S 09

HOMEWORK #9

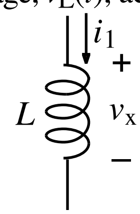
THE UNIVERSITY OF UTAH

1. In (a)-(c), the voltage $v_C(t)$ across a 500 nF capacitor is listed. Find the current, $i_C(t)$, flowing in the capacitor in each case as a function of time:



a) $v_C(t) = 5$ V
b) $v_C(t) = 30t$ kV/s
c) $v_C(t) = 1 - e^{-t/10\mu s}$ V

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



a) $i_L(t) = 3$ mA
b) $i_L(t) = 10t$ MA/s
c) $i_L(t) = 8\cos(2\pi \cdot 10\text{k} \cdot t)$ μA

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 -4 V.

$$v_C(t) = -12 + 10(1 - e^{-t/2\text{ms}}) \text{ V}$$

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.

$$v_L(t) = 10 - 4e^{-t/50\text{ms}} \text{ V}$$

5. Find the voltage, v_C, on the capacitor in the circuit below as a function of time if $v_C(t = 0^+) = 6$ V.