Inter American University of Puerto Rico
Bayamón Campus
School of Engineering
Department of Electrical Engineering

ELEN 3301 – Electric Circuits I

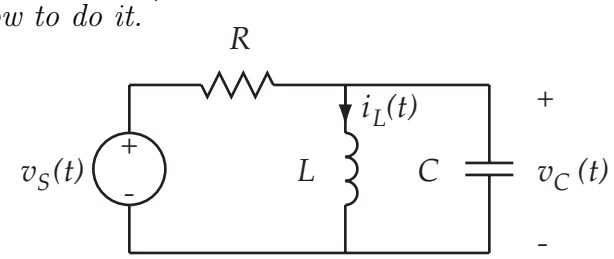
Problem Set 9

Due Wednesday, November 10

Reminder: Quiz 2 will be offered Wednesday, November 10 and will cover material given in class until October 27.

Problem 1:

(A) For the circuit below, $v_C(0) = 0$, $i_L(0) = 0$ and $v_S = V_S u(t)$. Find an algebraic expression for $v_C(t)$ if $R < \frac{1}{2}\sqrt{\frac{L}{C}}$. *You don't have to sketch the solution, but make sure you understand how to do it.*



(B) Repeat part (A) if $R > \frac{1}{2}\sqrt{\frac{L}{C}}$.

Problem 2: Find the solution for the differential equations listed below with the given initial conditions. *Again, you don't have to sketch the solutions, but make sure you understand how to do it.*

(A) $\dfrac{dv}{dt} + \dfrac{v}{\tau} = \dfrac{V_S u(t)}{\tau}$ $\qquad v(0) = 0$

(B) $\dfrac{d^2v}{dt^2} + 2\alpha\dfrac{dv}{dt} + \omega_0^2 v = \omega_0^2 V_S u(t)$ $\qquad \omega_0 > \alpha$ $\qquad v(0) = 0$ $\qquad \left.\dfrac{dv}{dt}\right|_{t=0} = 0$

(C) $\dfrac{d^2v}{dt^2} + 2\alpha\dfrac{dv}{dt} + \omega_0^2 v = \omega_0^2 V_S u(t)$ $\qquad \omega_0 < \alpha$ $\qquad v(0) = 0$ $\qquad \left.\dfrac{dv}{dt}\right|_{t=0} = 0$

Problem 3: Review problem sets 5-8 *carefully*. Summarize all the circuits, differential equations, solutions and graphs given to make sure you understand clearly all the differences between all types of circuits. *You do not have to hand in anything for this problem.*