

ECE 202 (Fall 2007)
 Homework No. 9
 Due: Friday, 11/9/2007

Instructions: Draw a box around to indicate each answer. Failure to do so will cost you 2 pts per offence.

Total = 100 pts

(P.1) [13 pts] The switch in Figure 1 has been in position *b* for a long time. It is moved to position *a* at $t=0$. Determine $v(t)$ for $t>0$. What is the time constant of this circuit?

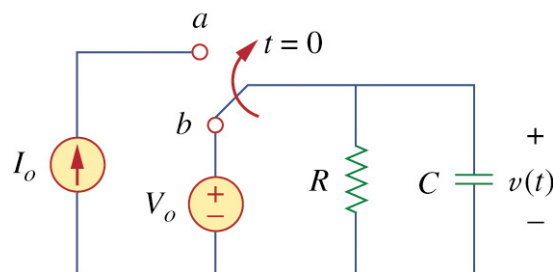


Figure 1 Circuit for Problem 1

(P.2) [50 pts] Consider the circuit in Figure 2. The input signal is $v_s(t) = 10 u(t)$ V and assume that at $t = 0$, -1 A flows through the inductor and +5 V is across the capacitor.

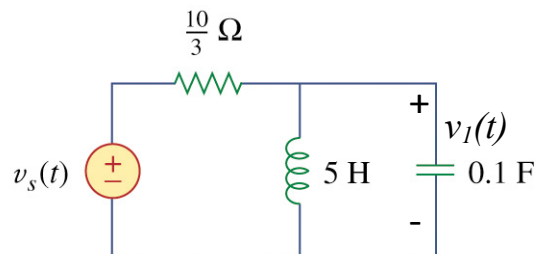


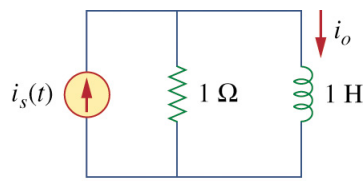
Figure 2 Circuit for Problem 2

- (a) [14 pts] Draw the s-domain circuit incorporating the initial conditions.
- (b) [11 pts] What is the voltage across the capacitor for $t > 0$?
- (c) [5 pts] What is the network function, $T_I(s)$, of this circuit? (Caution: recall how a network function is defined.) Express the denominator of $T_I(s)$ as a polynomial with an unity coefficient for the highest order of s .
- (d) [10 pts] What is the impulse response of the circuit in the time domain?
- (e) [10 pts] What is the step response of the circuit in the time domain?

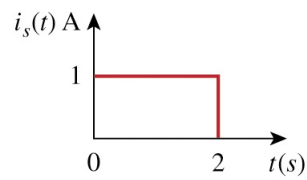
(P.3) [18 pts] Solve Problem 11-50 in text using

- (i) [10 pts] the t-domain convolution integral; and
- (ii) [8 pts] the s-domain approach.

(P.4) [19 pts] For the RL circuit in Figure 3(a), use the convolution integral to find the response $i_o(t)$ due to the excitation shown in Figure 3(b).



(a)



(b)

Figure 3 Circuit (a) and input signal (b) for Problem 4