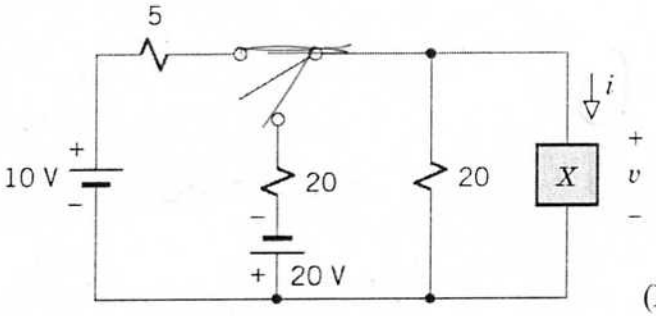
電路學第四次小考: 第九章

9:10-10:00 am, 12/17/2008

1. (40%) The switch in Fig. 1 has been at the upper position a long time before t = 0, when it goes to the lower position. The switch returns to the upper position at t_0 = 1 s. The resistance values are in ohms, and element X is a 4-H inductor.

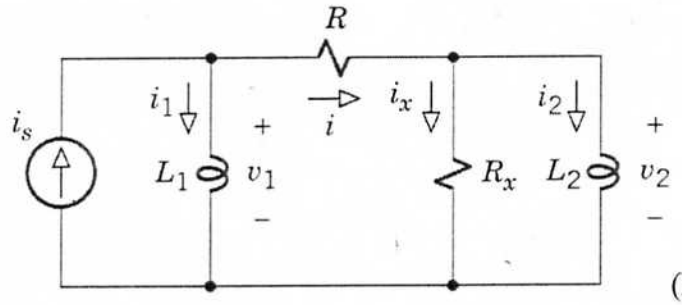
(a) (20%) Find $i(t)$ for $0 < t < t_0$, and determine when $i(t) = 0$.

(b) (20%) Find $i(t)$ for $t > t_0$, and sketch the waveform for $0^- \le t \le 3$.



(Fig.1)

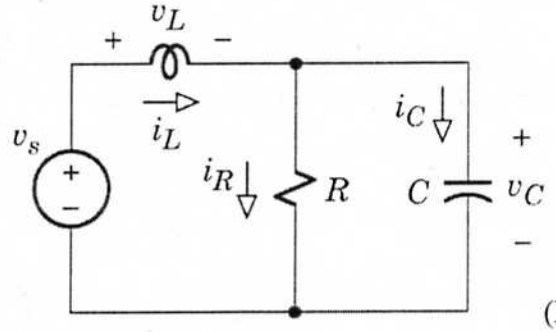
2. (20%) Let the circuit in Fig. 2 have $R_x = R$ and $L_1 = L_2 = L$. Derive the differential equation relating i to i_s. Show that the circuit is always overdamped, regardless of the values of R and L.



(Fig. 2)

3. (40%) In Fig. 3, derive the second-order differential equation for i_L. Find the i_L for t > 0 when L = 2 H, R = 5 Ω, C = 1/50 F and

$$v_s(t) = -10 \text{ V} \qquad t < 0$$
$$= 30 \text{ V} \qquad t > 0$$



(Fig. 3)