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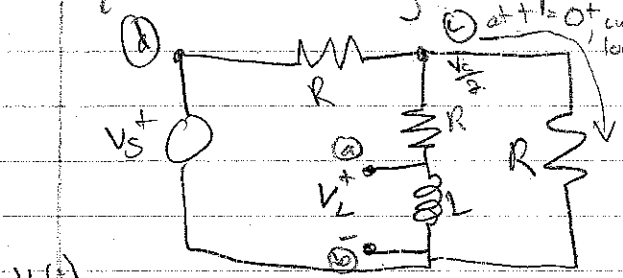
Exam 2 Review

Ch. 5 Op Amps
Ch 6 L, C (not 6.4, 6.5)
Ch 7 first order, homogeneous & particular w/DC sources
★ Impedance $Z(s)$ to find homogeneous response

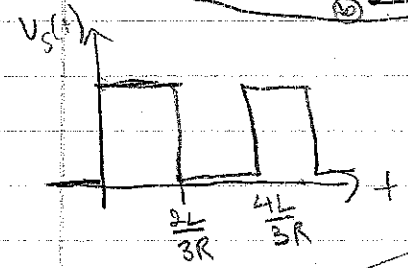
Remove V_S $V_S = 0$ S.C.
Remove I_S $I_S = 0$ O.C.

Sequential Switching + impedance



at $t = 0^+$, current goes around loop & sets up voltage, $\frac{V_S}{2}$

Find $v_L(t)$ if all $i, v = 0$ @ $t = 0$



$V_S \rightarrow$ S.C

$$Z(s) = \frac{sL\left(\frac{3R}{2}\right)}{sL + \frac{3R}{2}} = \frac{sL(3R)}{2sL + 3R}$$ ← zero used for current; ← poles used for voltage

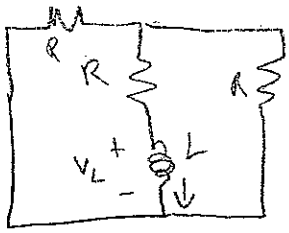
$s = -\frac{3R}{2L}$

$$V_{Lh} = Ae^{-\frac{3R}{2L}t}$$

$$V_L = V_{LH} + V_{LP} = Ae^{-\frac{3R}{2L}t} + 0$$

$$V_L(0^+) = A = \frac{V_S}{2}$$

$$\Rightarrow \boxed{V_L = \frac{V_S}{2} e^{-\frac{3R}{2L}t}} \quad 0 < t < \frac{2L}{3R}$$

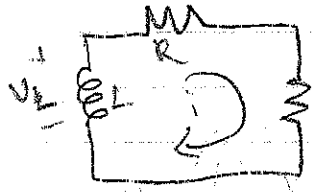


$\frac{2L}{3R}$ ← t → $\frac{4L}{3R}$

$v_L = Be^{-\frac{3R}{2L}t}$ (b/c homogeneous doesn't change t in this case, particular is still 0)

$v_L\left(\frac{2L}{3R}\right) = B = ?$

$t = \frac{2L}{3R}^-$ $\quad v_L = L\frac{di}{dt}$ @ $\frac{2L}{3R}^-$, $v_L = \frac{V_S}{2}e^{-1}$



$i = -i_L = \frac{\frac{V_S}{2}e^{-1}}{3R/2}$ $\quad v_L = \frac{V_S}{2}e^{-1}$