Use engineering paper. Work only on one side of the paper. Use this sheet as your cover sheet, placed on top of your work and stapled in the top left-hand corner. Number the problems at the top of the page, in the center of the sheet. **Do neat work. Underline your answers. Show how you got your equations. Be sure to show how you got your answers.** Each problem counts 10 points.

Work the following problems from the text.

7.3

7.5 Also use Pspice to obtain a plot of the current. Outlined in your small Pspice book.

7.9 Also use Pspice to obtain a plot of the voltage, $v_o(t)$.

7.12 $i(o^+) = 4 \, A$, \( i(t) = [4e^{-4t} \, A] \, u(t) \)

7.17

7.23
Determine the time constant for the following:

\[ \frac{50K \times 40K}{90K} = 22.22K \]

Find the resistance looking into a-b.

\[ R_{eq} = 10K + 22.22K \]

\[ R_{eq} = 32.22K \]

\[ \gamma = 0.1 \times 10^{-9} \times 32.2 \times 10^3 \]

\[ \gamma = 3.22 \mu \text{sec} \]
\[ V(10^-) = \frac{24 \times 4}{4 + 2} = 16 \text{V} = V(10^+) \]

\[ V(t) = 16e^{- \frac{t}{3}} \]

\[ i = -C \frac{\mathcal{E}(t)}{R} = (-\frac{1}{3})(-\frac{1}{3}) \times 16 \cdot e^{- \frac{t}{3}} \]

\[ V(t) = \frac{16}{9} e^{- \frac{t}{3}} \]

\[ i(t) = 1.778 e^{- \frac{t}{3}} \text{A} \]
\[ V_o(t) = 4e^{-\frac{t}{12}} = 4e^{-0.0833t} \]
Problem 7_9 ECE 300 HW #7 Spring 2006 wlg
Circuit is in steady state. At $t = 0$, the switch is open. Find $i(t)$ for $t > 0$.

$12V$

$t < 0$

$12V$

$i(0^-) = i(0^+) = \frac{12}{3} = 4\, A$

$t > 0$

$i(0) = I_0 = 4\, A$

$\gamma = \frac{1}{L} = \frac{2}{4} = 0.5$

$i(t) = 4e^{-2t}\, A$
Find $V_o(t)$ if $i(0) = 2 A$, $V_{1/4} = 0$

$I(t) = I_o e^{-\frac{t}{R}}$, $I_o = 2 A$, $T = \frac{T_o}{R} = \frac{V_4}{4} = \frac{1}{16}$

$I(t) = -2e^{-16t}$

$V_o = 3(1/4) + L \frac{d^2 i}{dt^2}$

$V_1 = 3\left(2e^{-16t}\right) + \frac{1}{4} \left(-16 \times 2e^{-16t}\right)$

$= (6e^{-16t} - 8e^{-16t})V$

$V_o(t) = -2e^{-16t}$
Given the following circuit in which \( V_0 (0) = 2 \, \text{V} \), find \( V_0 (t) \) and \( V_x (t) \), \( t \geq 0 \).

\[
I_x = \frac{2}{4} = 0.5 \, \text{A}, \quad I_0 = \frac{2}{2} = 1 \, \text{A}
\]

\[
I_H = -I_x - I_0 = -1.5 \, \text{A}
\]

\[
R_{eq} = \frac{2 \times 4}{2 \times 3} = \frac{8}{6} = \frac{4}{3}
\]

\[
\gamma = \frac{1}{\frac{4}{3}} = \frac{3}{4}
\]

\[
i' = -1.5 \, \text{e}^{-4t} \, \text{A}
\]

\[
V_0 = \frac{1}{3} \frac{d}{dt} \left( \frac{1}{3}(15) - \frac{1}{3} \right) e^{-4t} = 2e^{-4t}
\]

\[
V_0 (t) = 2e^{-4t} \, \text{V} \, \text{u}(t)
\]

\[
V_x = \frac{V_0 \times 1}{1 + 3} = 0.5e^{-4t} \, \text{V} \, \text{u}(t)
\]

\[
V_x = 0.5e^{-4t} \, \text{V}
\]