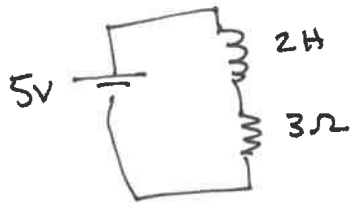
phys 341 Class 35 ch 13 : 1, 3, problem 18.pdf #31

1) 


$I = \frac{\mathcal{E}}{R}(1 - e^{-t/\tau})$ $\tau = \frac{L}{R}$

$= \frac{2}{3}$ sec

$\uparrow \frac{5}{3}$

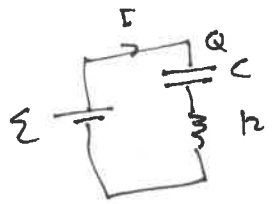
$= \frac{5}{3}(1 - e^{-t/2/3})$

@ $t = .3s$ $I = .604\,A$ $\frac{dI}{dt} = 1.59\ A/s$

$t = 1s$ $= 1.29\,A$ $= .558\ A/s$

$t = 4s$ $= 1.66\,A$ $= 6.2\ mA/s$

$\frac{dI}{dt} = \frac{\mathcal{E}}{R}\frac{1}{\tau}e^{-t/\tau} = \frac{\mathcal{E}}{L}e^{-t/\tau}$

3) 

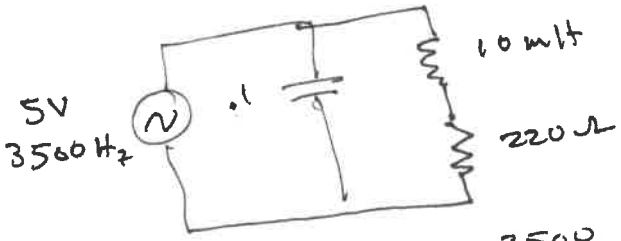

$\mathcal{E} = \frac{Q}{C} + R\frac{dQ}{dt}$

homo soln: $Q = Q_0 e^{-t/RC}$

particular soln $Q = \mathcal{E}C$

B.C. $Q = 0$ @ $t = 0$

$Q = \mathcal{E}C(1 - e^{-t/(RC)})$

#31 


$\omega = 2\pi f = 2\pi \cdot 3500$

For part b) the capacitor does not matter

$I = \frac{5}{R + i\omega L} = .01137 - .01136$

$\approx .01607\ A = A$

$V_R = 220 \cdot I = 3.54\,V = V_2$

$V_L = \omega L I = 3.54\,V = V_1$

$\frac{1}{Z} = i\omega C + \frac{1}{220 + i\omega L}$

↳ mathematica

$Z = 439.4 + 14.2i$

$I = \frac{5}{Z} = .01137 - .000368\,I$

current less voltage

$= 11.4\ mA\ \angle -1.9^\circ$