

1. (5 points) Solve for the charge on the capacitor at time t , $q(t)$, for the LRC circuit with inductance $L = 1$ henry, $R = 4$ ohm, $C = \frac{1}{13}$ farad, and an electromotive force $E(t) = 26$ volts if $q(0) = 8$ and $q'(0) = 0$. Hint: use $Lq''(t) + Rq'(t) + \frac{1}{C}q(t) = E(t)$. Show work.

2. (5 points) A spring on a frictionless track has an attached mass of 9 kg and no forcing function. What is the spring constant if the spring when set in motion has a frequency of 5 cycles/second? Defend your answer.

3. (5 points) Use undetermined coefficients to find the general solution for $y'' - 25y = 3e^{2x}$. Show work.

4. (5 points) Use variation of parameters to find a particular solution for $y'' + y = \sec(x) \tan(x)$.