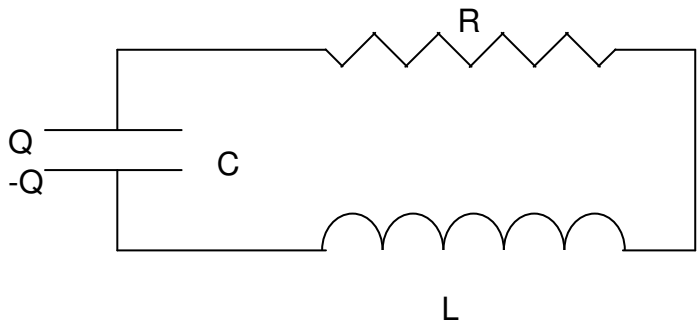
Homework 5:

Remember: In addition to this problem, you also have a "Mastering Physics" assignment Due March 7. Due 10:00, Friday, March 6. Outside my office Write up of the solution to this problem in a coherent fashion.

In class we have discussed LC, RL and RC circuits (with no external sources). Here I want you to consider an RLC circuit with no external source. A diagram is given below.

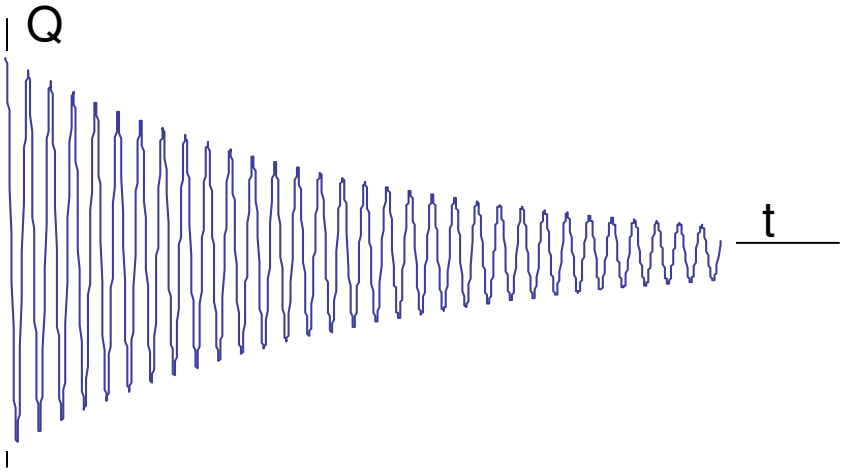


a) As a first step, use Kirchkoff loop rule to show that the charge on the capacitor satisfies the following equation $\frac{d^2Q}{dt^2}L+\frac{dQ}{dt}R+\frac{Q}{C}=0$.

b) Show that there is solution for this equation of the form:

$Q(t)=A\exp\left(-\frac{Rt}{2L}\right)\cos(\omega t)$ with $\omega=\sqrt{\frac{1}{LC}-\left(\frac{R}{2L}\right)^2}$. (Just plug & chug to verify.)

c) Assume that resistor is small(meaning that $\left(\frac{R}{L}\right)^2$ is much smaller than $\frac{1}{LC}$.) A plot of that case is given below



Explain how the qualitative features of this graph such as the distance between neighboring maxima and the rate at which the maxima drop off with t are related to the parameters R L & C..