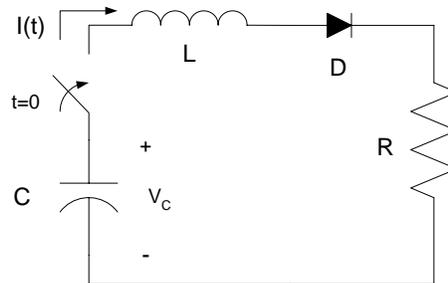


PROBLEM SET #1

Problem: The following circuit is used to create a pulse of current through the resistance. The diode (D) opens the circuit when the current attempts to go negative (thus only positive values of current are allowed).



The circuit parameters are $L=150\text{mH}$, $C = 270\mu\text{F}$, and $R = 40\Omega$. The capacitor is initially charged to 100V and the switch is closed at time equal to zero. The current flowing through the inductor is expressed by

$$I(t) = 8.018e^{-133.33t} \sin(83.15t) \text{ A} \quad \text{for } I(t) \geq 0 \text{ A}$$

Write a MATLAB script file (M-file) that implements the following

1. Assigns a vector of 2000 time values ranging uniformly from 0 to 0.05 seconds.
2. Implements the expression for $I(t)$. If any values of current are negative, they must be replaced by zero [Hint: consider using the “find” command].
3. Given $I(t)$, computes the power consumed by the resistance at each time instance. [power equals resistance times the current squared at each time instant]
4. Evaluates the energy consumed by the resistance by multiplying each value of power by the Δt between the samples, then summing up the results.
5. Determines the maximum value of the current
6. Plots the current waveform, labeling the axes, adding a grid, and annotating the value of the maximum current on the plot.