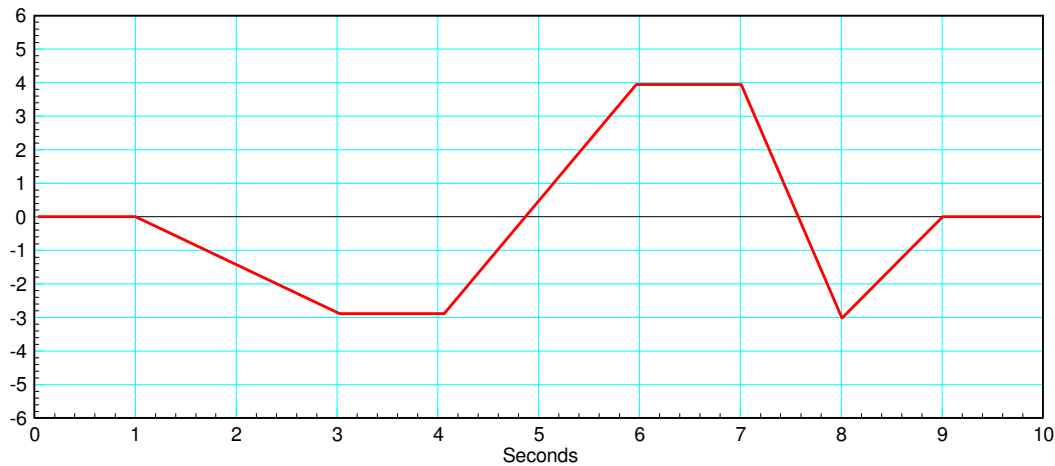


# ECE 111 - Homework #11

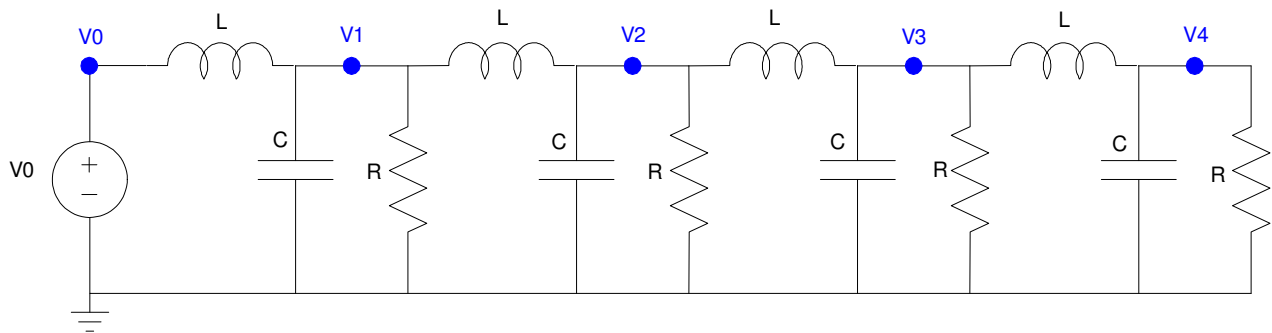
ECE 351 Electromagnetics & The Wave Equation  
Due April 7th. Please submit via email or on BlackBoard

1) Assume the current flowing through a one Henry inductor is shown below. Sketch the voltage.

$$V = L \frac{dI}{dt}$$



## 4-Node RLC Circuit



$R = 330\Omega$ ,  $C = 0.1F$ ,  $L = 0.12H$ . Repeat for 30 nodes for problems 4-6

2) Write the dynamic equations for the following 4-stage RLC circuit. (i.e. write the node equations)

3) Assume  $V_{in} = 10V$  and the initial conditions are zero ( $V_1 = V_2 = V_3 = V_4 = 0$ ). Solve for the voltages at  $t = 3$  seconds. *Hint: Solve numerically using Matlab*

**30-Node RLC Circuit ( hint: modify the program Wave.m )**

4) Expand the RLC circuit from problem #2 to 30 nodes. Plot the voltage at  $t = 6$  seconds (just after the reflection) for  $1 / R_{30} C = 0.01$

5) Plot the voltage at  $t = 8$  seconds for  $1 / R_{30} C = 100$

6) Determine experimentally  $R_{30}$  so that the reflection is almost zero