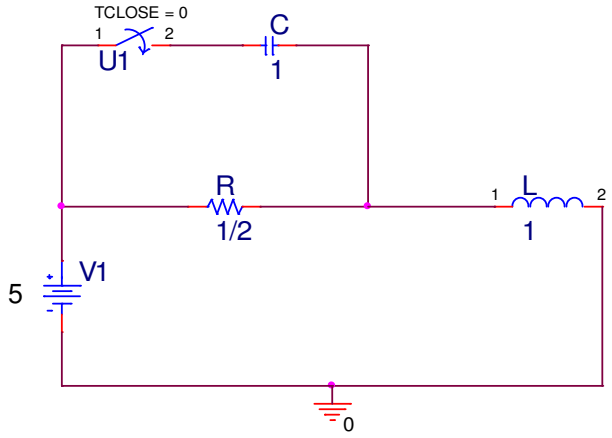


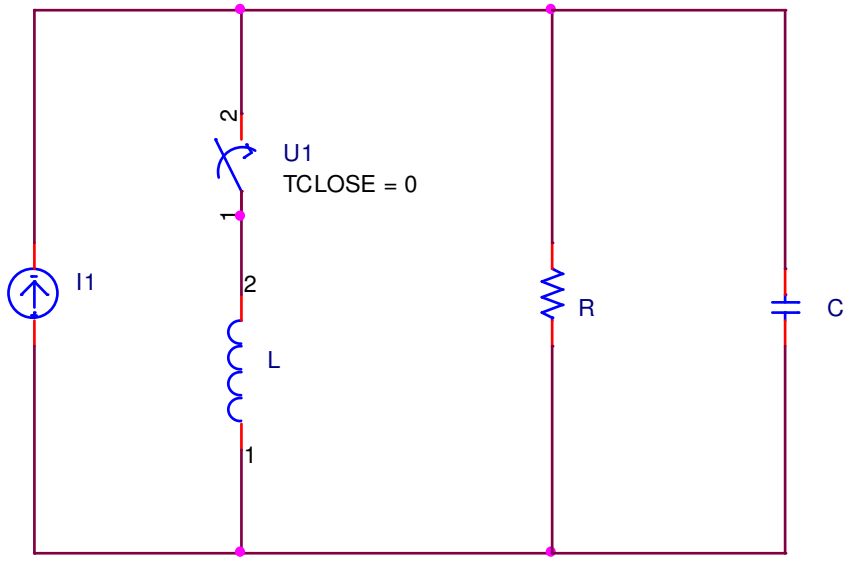
In the above circuit, a 5V DC source is shown. At t = 0, the switch in series with the capacitor is closed.

a) Draw the s-domain equivalent circuit. Include all initial condition source components.

b) Determine the transfer function for the voltage across the inductor, VL(s)= N(s)/D(s), where N(s) and D(s) are poloynomials.

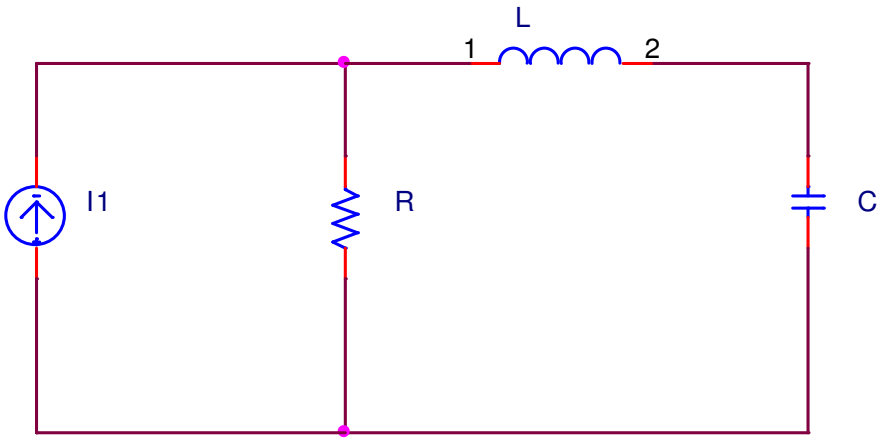
c) Apply partial fraction expansion to your above expression

d) Based on your result in part c), determine the voltage across the inductor as a function of time.



a) Transform the circuit into the s domain
b) Find the zero-state and zero-input components of V(s).
c) Find v(t) for I1 = 1mA, L = 2H, R=1.5kΩ and C = 1/6 μf
With source transformation

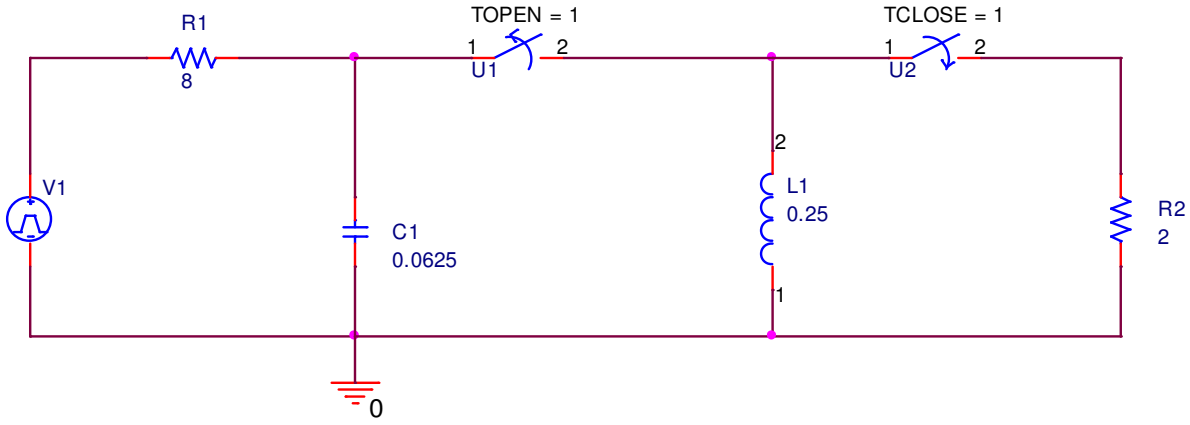
Node Analysis in the s-domain



a. Draw the s-domain circuit
b. Find node equations and put in standard form
c. Solve the node equations and find the zero-state and zero-input reponses
d. Solve for the zero state component of the waveforms VA(t) when

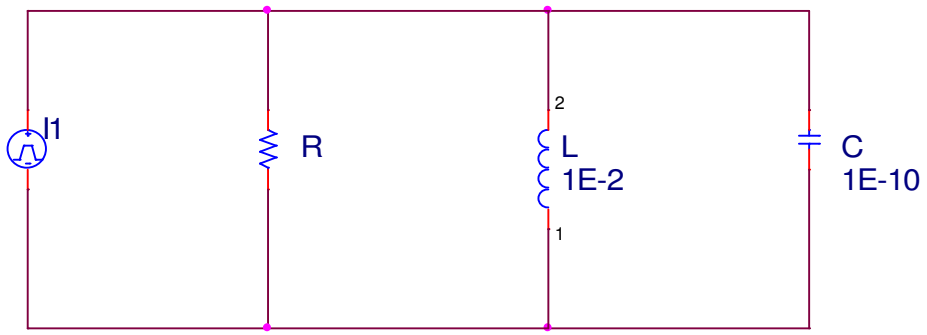
$R_2 := 1k\Omega \quad C_2 := 0.2\mu F \quad L_2 := 500mH \quad I_1(t) = 10\,u(t)\,mA$

Review Problems for Test



In the above circuit, the source is 8V for t<0 and 16 V for t>0. Additionally, the switch U1 closes are t = 1 s and switch U2 open at t = 1 s (They close and open at the same time).

a. At t=0+, determine the current through L1
b. At t=0+ determine the voltage across L1
c. For t < 1s, determine the differential equation for the current through R1 (Draw the circuit)
d. For t<1s, is the circuit underdamped, overdamped or critically damped?
e. Determine the voltage across L1 as a function of time for 0<t<1s
f. Based on your above expression, dtermine the voltage across the inductor at t =1s
g. Determine the voltage as a function of time across the inductor for t>1.



In the above circuit, the source current is 20mA for $t < 0$ and 0 for $t > 0$ (the source turns off at $t = 0$).

a. What is the initial (t=0+) current through the inductor? What is the (t=0+) voltage across the inductor?

b. What is the DC steady state current through the inductor a t goes to ∞?

c. Symbolically, what is the differential equation defining the current through the inductor?

d. For R1 = 100Ω, determine the current through the inductor as a function of time for t>0.

e. For R1 = 5k Ω?

f. For R1 = 100kΩ?