GEORGIA INSTITUTE OF TECHNOLOGY
School of Electrical and Computer Engineering

Course EE 2250

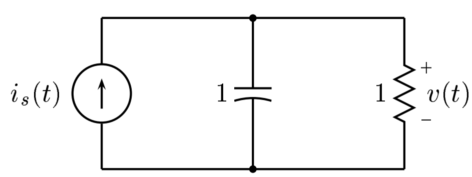
Electric Circuit Analysis

Assigned: February 19, 1999
Due: February 26, 1999

Problem Set #7

Reading: Read the following sections from Dorf and Svoboda:
Chapter 14, Section 14.6
Chapter 8, Section 8.3 (Focus on the results here, not the approach, since we have used Laplace transforms to derive these results rather than solving the diffeential equations.)

Problem 7.1: The circuit below is initially at rest (i.e., the initial capacitor voltage is zero.



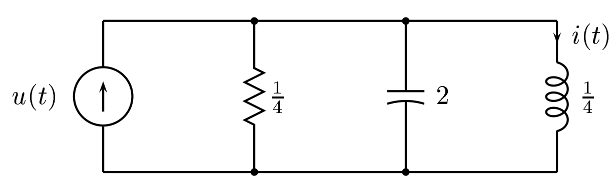
Determine the voltage $v(t)$ for each of the excitations below:

(a) $i_s(t) = u(t)$.

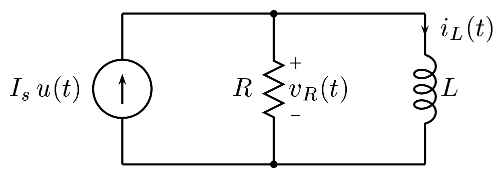
(b) $i_s(t) = \sin(t)\, u(t)$.

(c) $i_s(t) = tu(t)$.

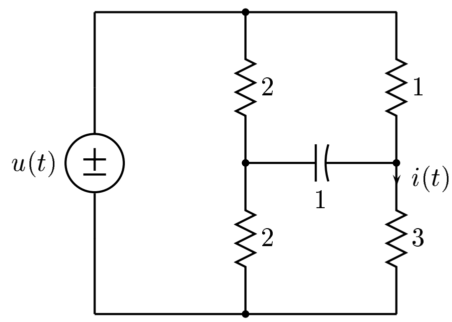
Problem 7.2: The circuit below is at rest for $t < 0$. Determine $i(t)$.



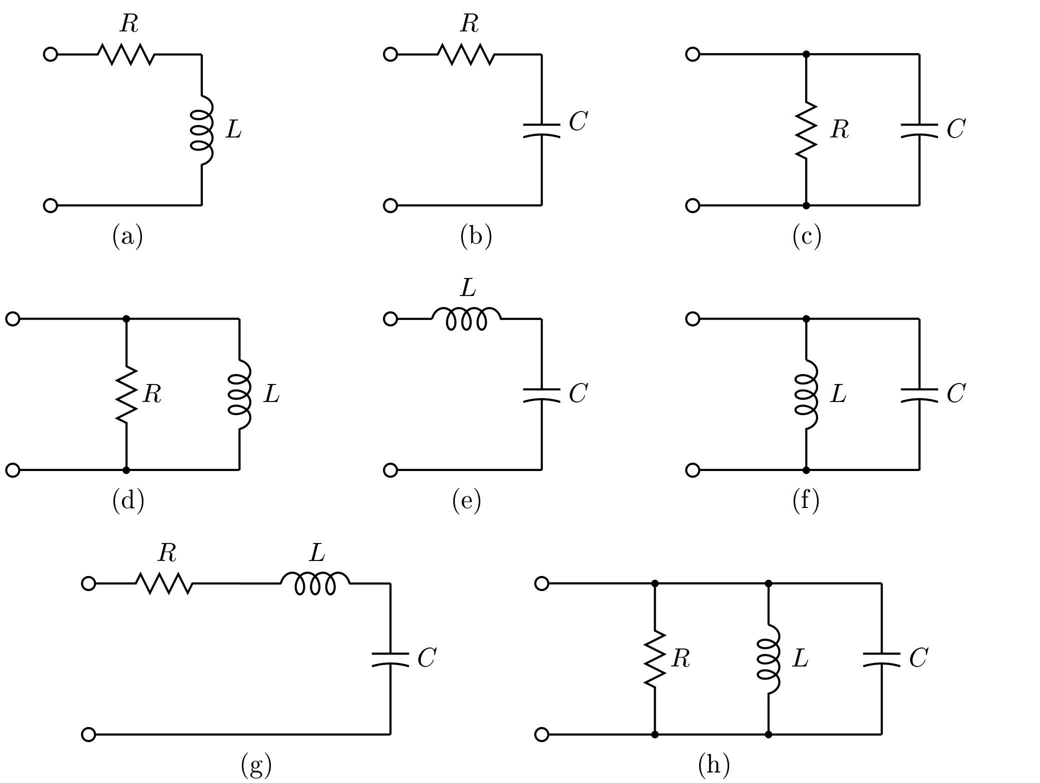
Problem 7.3: The circuit below is initially at rest. Determine $v_R(t)$ and $i_L(t)$ "by inspection".



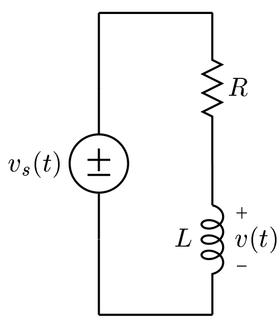
Problem 7.4: For the circuit below, determine the current $i(t)$ "by inspection"



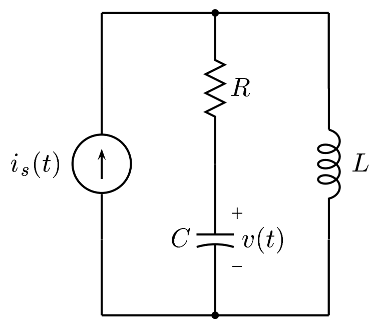
Problem 7.5: The *driving-point impedance* of a two-terminal network is the ratio of the Laplace transform of its terminal voltage to the Laplace transform of the current entering the positive terminal. For each of the networks below, determine the driving-point impedance. Express your answers as ratios of polynomials in s.



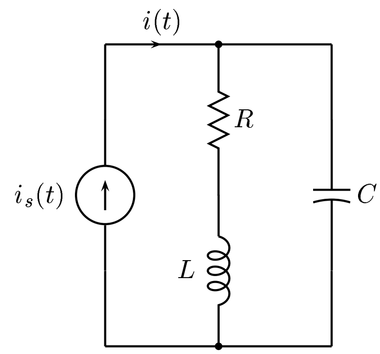
Problem 7.6: For each of the networks below determine the system function relating the indicated output variable to the excitation (input). Your answers should be expressed as ratios of polynomials in s.



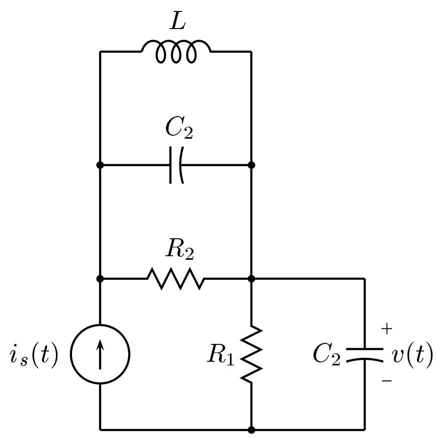
(a)



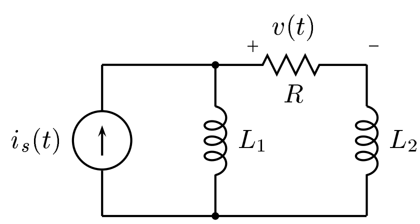
(b)



(c)



(d)



(e)