GEORGIA INSTITUTE OF TECHNOLOGY
School of Electrical and Computer Engineering

Course ECE 2040

Circuit Analysis

Assigned: March 3, 2000
Due: March 17, 2000

Problem Set #8

Reading: Read the following sections from the class notes:
Chapter 6, Section 6.1.4, 6.2, 6.3
Reading: Read the following sections from Irwin and Wu:
Chapter 6, Sections 6.1, 6.2, 6.3 (First-order circuits) The approach used in Irwin is different from the approach that we have used in class. These sections are useful for what they say about first-order circuits, but you do not need to worry about solving differential equations.
Chapter 14, Sections 14.1, 14.2, 14.3 (circuits in the Laplace domain)

Problem 8.1: For the circuit shown in Figure 1.

(a) Find $v_r(t)$ for $t > 0$ if $i_\ell(0) = 0$.

(b) Find $v_r(t)$ for $t > 0$ if $i_\ell(0) = 5$.

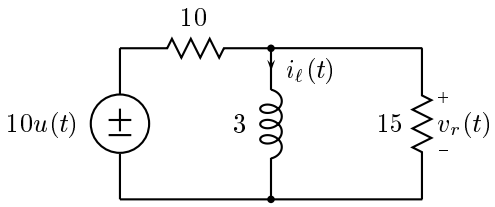


Figure 1: Circuit for Problem 8.1.

Problem 8.2: Use the inspection technique to determine the current $i(t)$ in the circuit in Figure 2.

Problem 8.3: The circuit in Figure 3 is at initial rest and $v_s(t) = u(t)$.

Problem 8.4: For each of the networks in Figure 4, determine the equivalent impedance. Express your answers as ratios of polynomials in s.

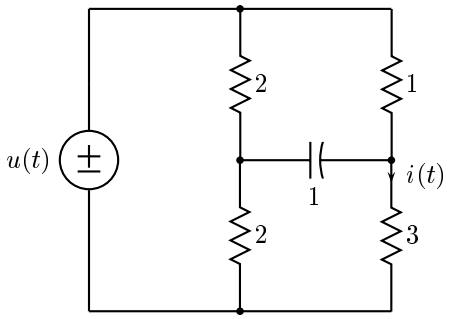
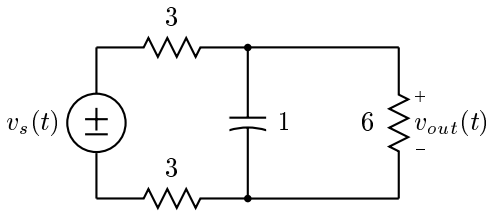


Figure 2: Circuit to be solved by inspection in Problem 8.2.



(a) Determine $v_{out}(0)$.

(b) Determine $v_{out}(\infty)$.

(c) Determine $v_{out}(t)$ for all t.

Figure 3: Circuit for Problem 8.3.

Problem 8.5: For each of the networks in Figure 5 determine the Laplace domain formula that relates the indicated output variable to the source variable. Your answers should be expressed in terms of the Laplace transforms of the source variables and the Laplace domain variable s.

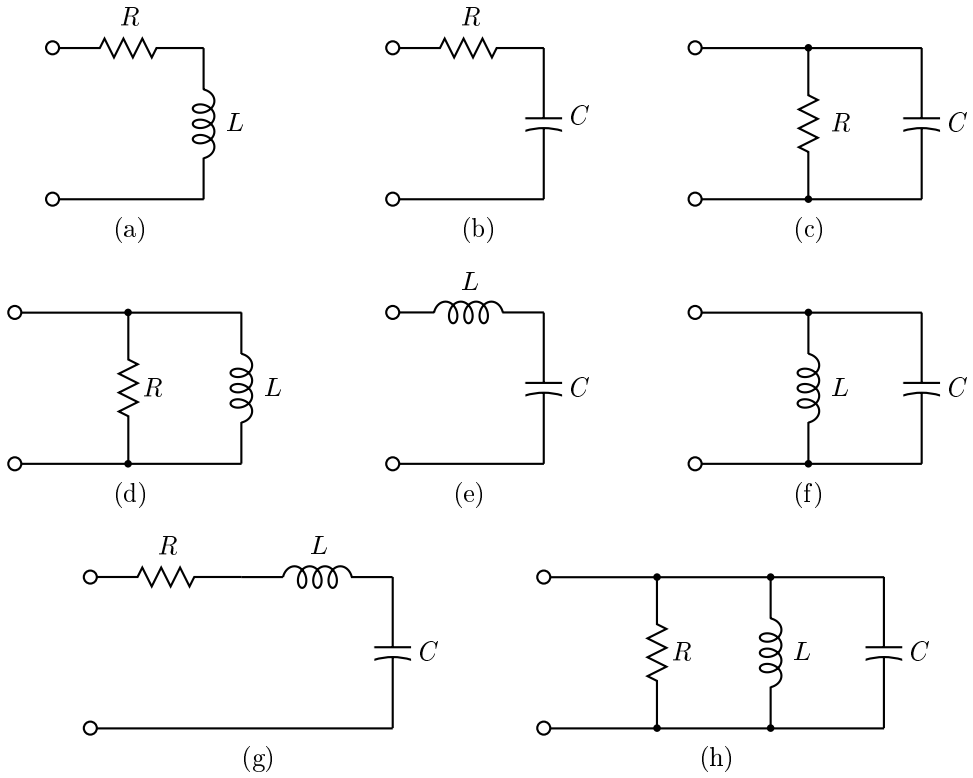


Figure 4: Circuits for Problem 6.9.

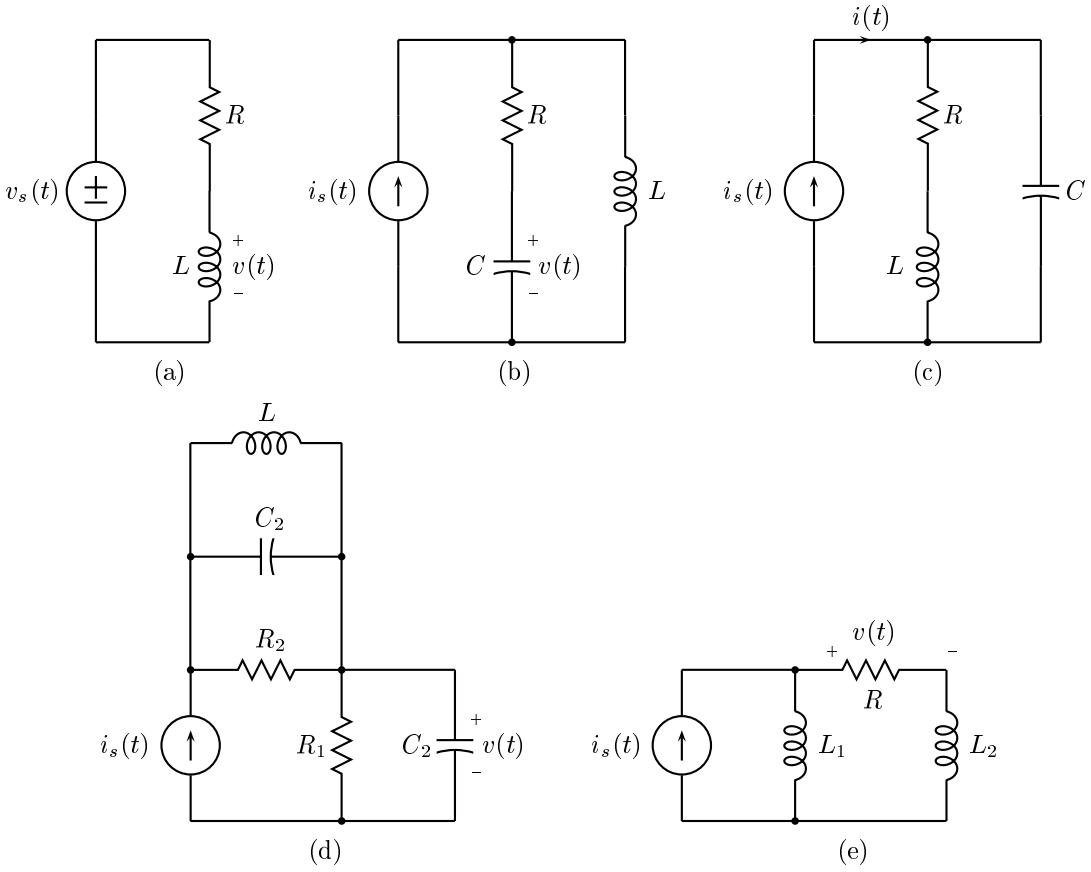


Figure 5: Networks for Problem 6.9.