

GEORGIA INSTITUTE OF TECHNOLOGY
School of Electrical and Computer Engineering

Course ECE 2040
Circuit Analysis

Assigned: October 20, 2000

Due: October 27, 2000

Problem Set #9

Reading: Read the following sections from the class notes:

Chapter 6, Sections 6.4, 6.5

Chapter 7, Sections 7.1, 7.2, 7.3

Reading: Read the following sections from Dorf and Svoboda:

Chapter 14, Section 14.8–14.11; (System functions)

Announcement: Quiz #3 will be held during the class hour on Friday, November 3, 2000. It will be a closed book test, although calculators are permitted and one 8.5in × 11in sheet of handwritten notes are permitted. It will cover problem sets 6–9.

Problem 9.1: For each of the networks in Figure 1, determine the equivalent impedance. Express your answers as ratios of polynomials in s .

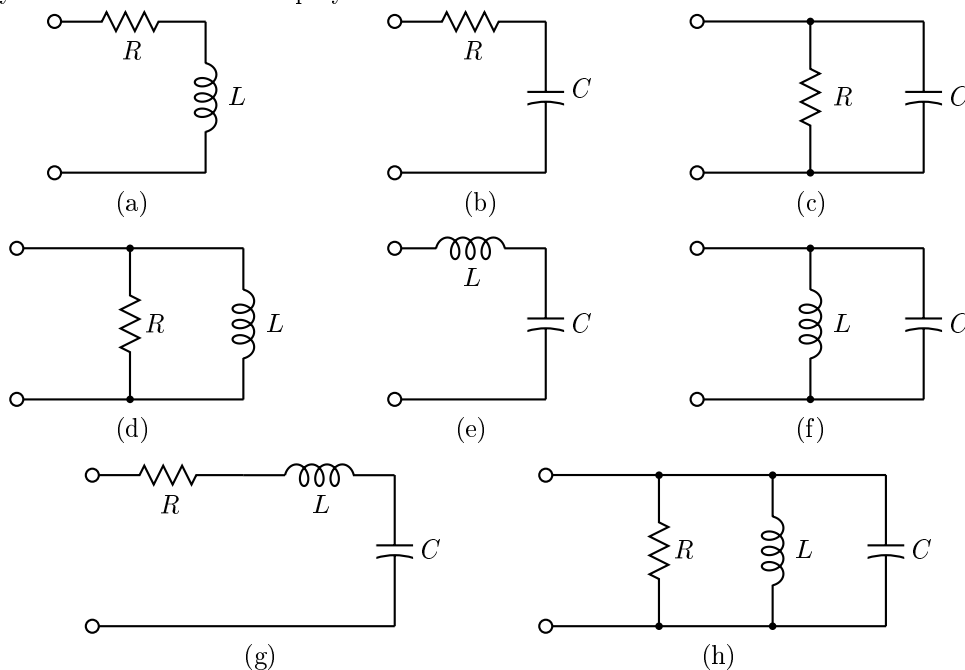


Figure 1: Circuits for Problem 9.1.

Problem 9.2: Find the Laplace domain Thevenin equivalent network that corresponds to the one-port circuit in Figure 2 at initial rest.

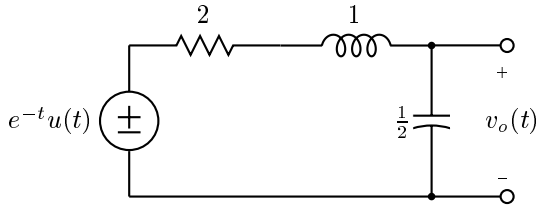


Figure 2: Circuit for Problem 9.2.

Problem 9.3: Find $v_{out}(t)$ for $t > 0$ when $v_{in}(t) = \cos(1000t)$ and $v_{out}(0) = 0$ for the circuit drawn in Figure 3.

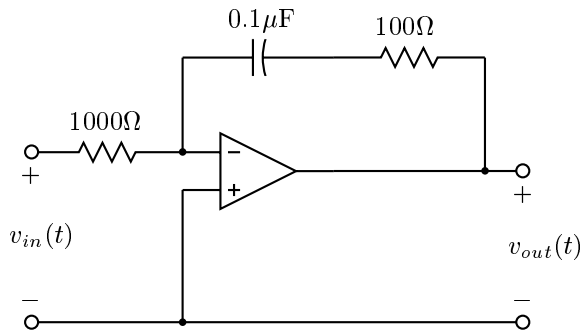


Figure 3: Circuit for Problem 9.3.

Problem 9.4: When $i_s(t) = 2e^{-2t}$ in the circuit in Figure 4, the voltage drop across the inductor is observed to be $v_\ell(t) = 2e^{-4t} - e^{-2t}$ for $t > 0$. Determine the values of R and L .

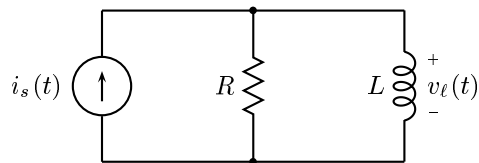


Figure 4: A circuit with unknown values of R and L for Problem 9.4.

Problem 9.5: Find the system function $H(s) = V_{out}(s)/V_{in}(s)$ for the circuit in Figure 5.

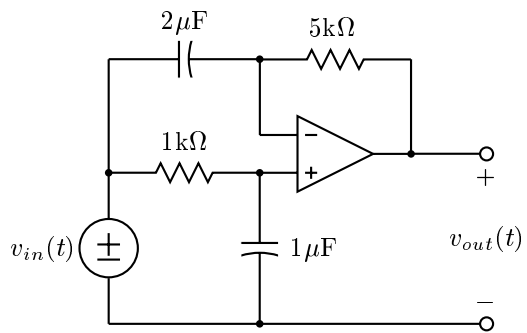


Figure 5: Circuit for Problem 9.5.