

GEORGIA INSTITUTE OF TECHNOLOGY  
School of Electrical and Computer Engineering

Course ECE 2040

Circuit Analysis

Assigned: March 27, 2001

Due: April 6, 2001

### Problem Set #10a

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**Reading:** Read the following sections from the class notes:

Chapter 7, Sections 7.1–7.3

**Reading:** Some of same topics are discussed in Dorf and Svoboda:

Chapter 14, Section 14.10, 14.11 (input/output viewpoint)

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**Note:** The due date for Problem Set 10 is changed to April 6. This problem set should be turned in at the same time.

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**Problem 10a.1:** The circuit in Figure 1 is at initial rest.

- (a) Find the system function  $H(s)$  that relates the output  $I_{out}(s)$  to the input  $V_{in}(s)$ .
- (b) Find the impulse response of the system  $h(t)$ .

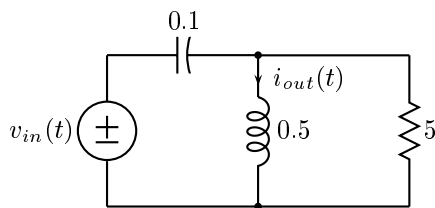


Figure 1: Circuit for Problem 10a.1.

**Problem 10a.2:** The network of Figure 2 is initially at rest. Determine the voltage  $v(t)$  for each of the inputs below:

- (a)  $i_s(t) = u(t)$
- (b)  $i_s(t) = (\sin t)u(t)$
- (c)  $i_s(t) = tu(t)$

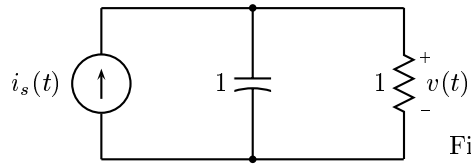


Figure 2: Circuit for Problem 10a.2.

**Problem 10a.3:** (a) The system function of the circuit in Figure 3, which is at initial rest, has the form

$$H(s) = \frac{V_{out}(s)}{V_{in}(s)} = \frac{as + b}{s + c}.$$

Determine the values of  $a$ ,  $b$ , and  $c$ .

(b) Determine  $v_{out}(t)$  for all  $t$ , if  $v_{in}(t) = e^{-2t}u(t)$ .

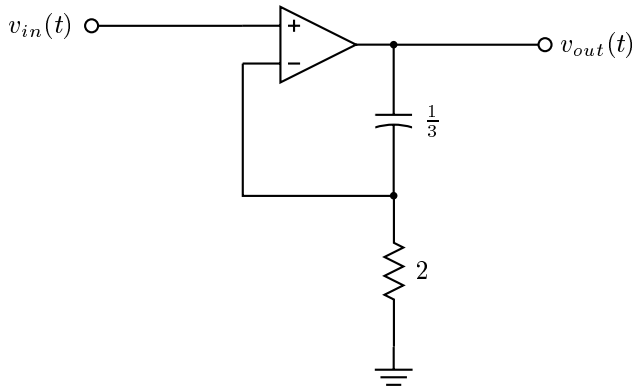


Figure 3: Circuit for Problem 10a.3.

**Problem 10a.4:** Find the system function that relates  $V_{out}(s)$  to  $v_{in}(s)$ .

