

GEORGIA INSTITUTE OF TECHNOLOGY
School of Electrical and Computer Engineering

ECE 2040
Circuit Analysis

Quiz #3

Friday, November 3, 2000

Name: _____

GENERAL INSTRUCTIONS

1. This is a *closed book, closed notes* exam. You may use a calculator if you choose.
2. Please do all of your work on the exam itself. You may use the backs of the pages, if necessary.
3. Please be as neat and well organized as possible.
4. Clearly indicate your answers.

<i>Problem</i>	<i>Max</i>	<i>Score</i>
1	25	
2	25	
3	25	
4	25	
Total	100	

Problem Q3.1: The inverse Laplace transform of

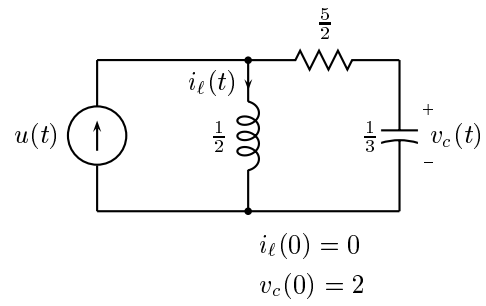
$$X(s) = \frac{s + 2}{(s + 2)^2 + 9}$$

has the form

$$x(t) = K e^{-at} \cos(\omega_0 t + \phi).$$

Determine the values of K , a , ω_0 , and ϕ .

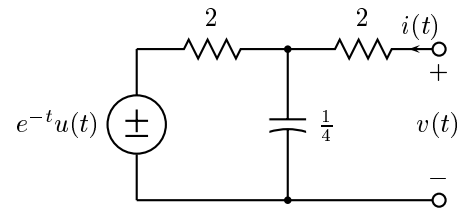
Problem Q3.2:



- (a) Sketch the mapping of the circuit to the Laplace domain.
- (b) Compute the Laplace transform of the capacitor voltage, $V_c(s)$.
- (c) Compute $v_c(t)$ for $t \geq 0$.

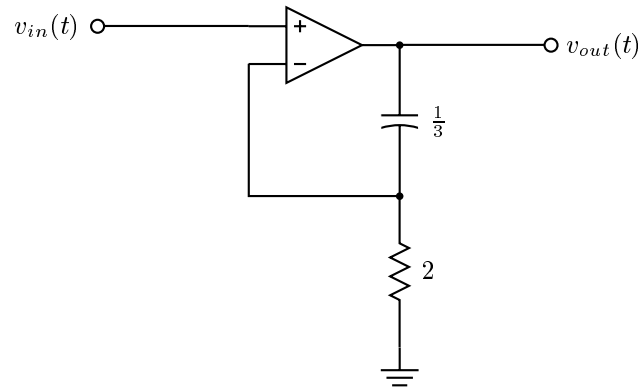
Problem Q3.3:

The two-terminal network above is at initial rest.



- Compute the Laplace transform of the open-circuit voltage $V_{oc}(s)$ for the above circuit.
- Compute the Laplace transform of the short-circuit current $I_{sc}(s)$ for the other circuit.
- Determine and sketch a Laplace-domain Thevenin equivalent network corresponding to the two-terminal network above.

Problem Q3.4:



- (a) The system function of the above circuit, 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 $v_{in}(t) = e^{-2t}u(t)$.