

GEORGIA INSTITUTE OF TECHNOLOGY
School of Electrical and Computer Engineering

ECE 2040
Circuit Analysis

Quiz #1

Wednesday, September 13, 2000

Name: _____

GENERAL INSTRUCTIONS

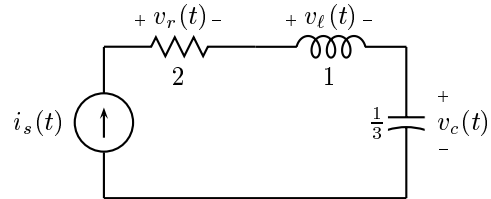
1. This is a *closed book, closed notes* exam. You may use a calculator if you choose.
2. Please do all of your work on the exam itself. You may use the backs of the pages, if necessary.
3. Please be as neat and well organized as possible.
4. Clearly indicate your answers.

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

Problem Q1.1: For the circuit below the current source waveform is

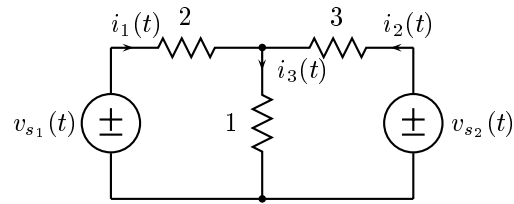
$$i_s(t) = \begin{cases} e^{-t} - e^{-2t}, & t > 0 \\ 0, & t < 0 \end{cases}$$

It is known that $v_c(-\infty) = 0$.



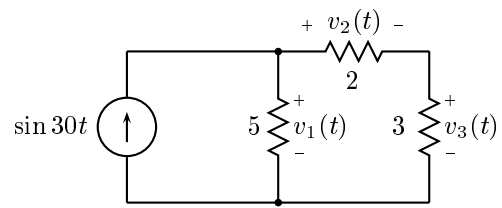
- (a) What is $v_r(t)$?
- (b) What is $v_\ell(t)$?
- (c) What is $v_c(t)$?

Problem Q1.2:

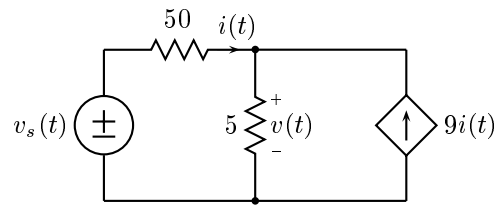


- (a) For the above circuit write a sufficient set of KCL equations needed to find the equilibrium solution. These should be in terms of the variables $i_1(t)$, $i_2(t)$, and $i_3(t)$.
- (b) Write a sufficient set of KVL equations to find the equilibrium solution. These should also be in terms of the variables $i_1(t)$, $i_2(t)$, and $i_3(t)$.
- (c) Express your complete set of equations in matrix-vector form. You do not need to solve them.

Problem Q1.3: Solve the circuit below for $v_1(t)$, $v_2(t)$, and $v_3(t)$.



Problem Q1.4:



In the circuit above the only variables of interest are $i(t)$ and $v(t)$.

- (a) Using the basic network as your guide write a minimal set of KCL equations in terms of $i(t)$ and $v(t)$ to specify the equilibrium solution.
- (b) Write a similar set of KVL equations.
- (c) Solve these for $i(t)$ and $v(t)$.