GEORGIA INSTITUTE OF TECHNOLOGY
School of Electrical and Computer Engineering

Course EE 2250

Electric Circuit Analysis

Assigned: April 1, 1999
Due: April 8, 1999

Problem Set #1

Reading: Read the following sections from the class notes:
Chapter 1, Sections 1.1–1.5

Reading: Read the following sections from Dorf and Svoboda:
Chapter 1, Sections 1.3–1.5; (definitions of voltage and current)
Chapter 2, Sections 2.3, 2.5; (resistors and sources)
Chapter 3, Sections 3.3; (Kirchoff's Laws)
Chapter 7, Sections 7.3, 7.6; (definitions of capacitors and inductors)

Problem 1.1: The current source in the network shown in Figure 1a has the time dependence shown in Figure 1b.

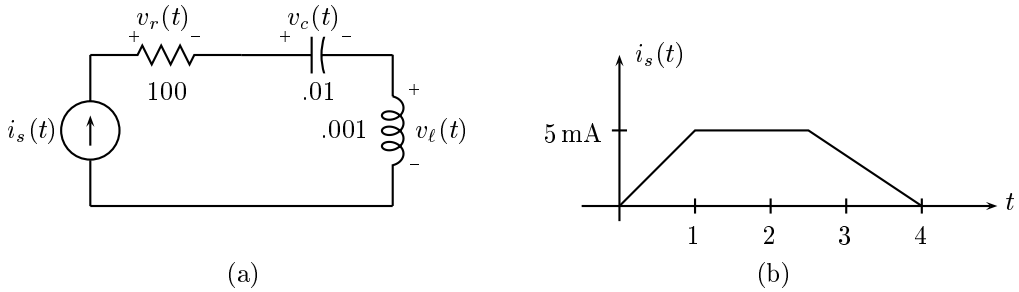


Figure 1:

(a) Sketch $v_r(t)$.

(b) Sketch $v_c(t)$.

(c) Sketch $v_\ell(t)$.

Problem 1.2: (a) Write the KCL equations that constrain the currents at all of the nodes of the network in Figure 2.

(b) Write the KVL equations that constrain the voltages for all of the meshes in that same figure.

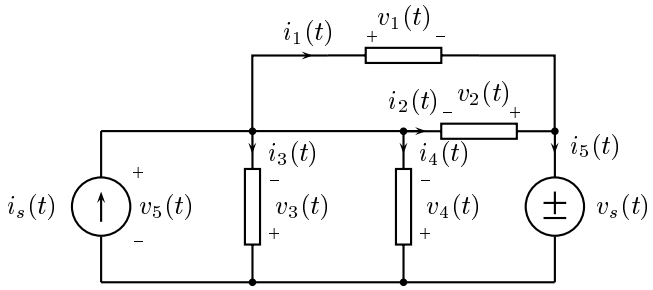
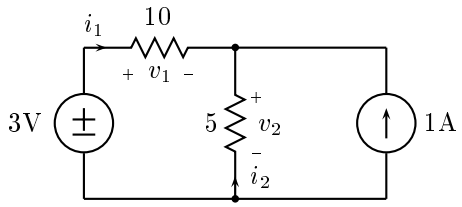


Figure 2: Figure for Problem 1.2.

Problem 1.3: In the circuit below both source waveforms (and all of the element variables) are constant. Compute the values of i_1, v_1, i_2, and v_2.



Problem 1.4: Determine the current $i(t)$ in the circuit shown in Figure 3. In order to do this you will need to define a number of element voltages and currents, write KVL and KCL equations and impose the element relations for the resistors.

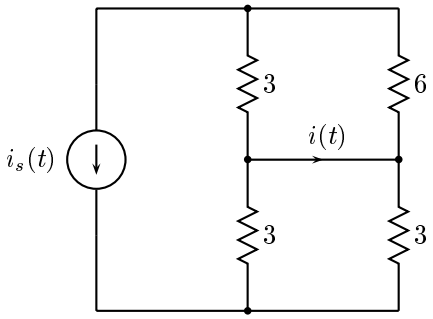


Figure 3: Figure for Problem 1.4.

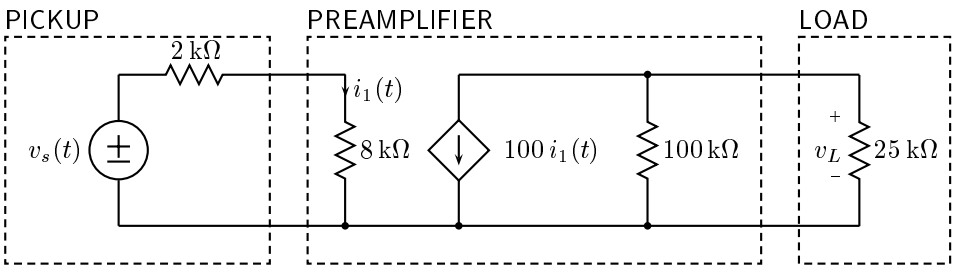


Figure 4:

Problem 1.5: In the center of Figure 4 is a model of a one-transistor preamplifier that is used to amplify the output of a low amplitude magnetic pickup, and drive a 25 kΩ load. Express the voltage $v_L(t)$ measured across the load in terms of $v_s(t)$.