GEORGIA INSTITUTE OF TECHNOLOGY
School of Electrical and Computer Engineering

Course ECE 2040

Circuit Analysis

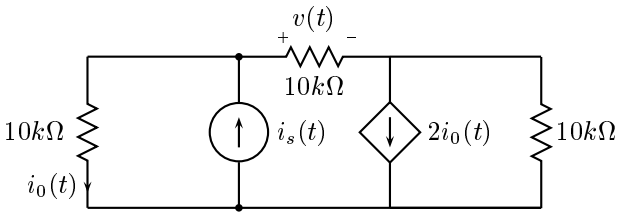
Assigned: January 21, 2000
Due: January 28, 2000

Problem Set #2

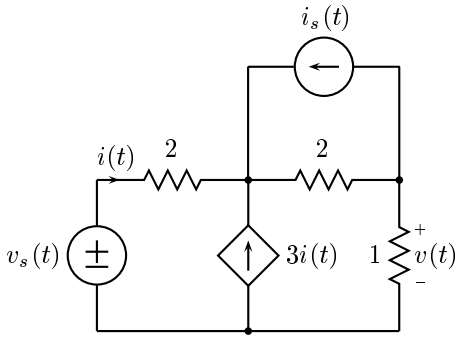
Reading: Read the following sections from the class notes:
Chapter 2, Sections 2.1.1–2.1.3
Appendix A, All sections

Note: None of the material appears in Irwin and Wu.

Problem 2.1: Find $v(t)$ in the following circuit. You may use MATLAB to help solve the equations if you wish.



Problem 2.2: In the circuit below determine $v(t)$ in terms of $v_s(t)$ and $i_s(t)$.



Problem 2.3: This problem is concerned with the three networks shown in Figure 1.

(a) For the network in (a)

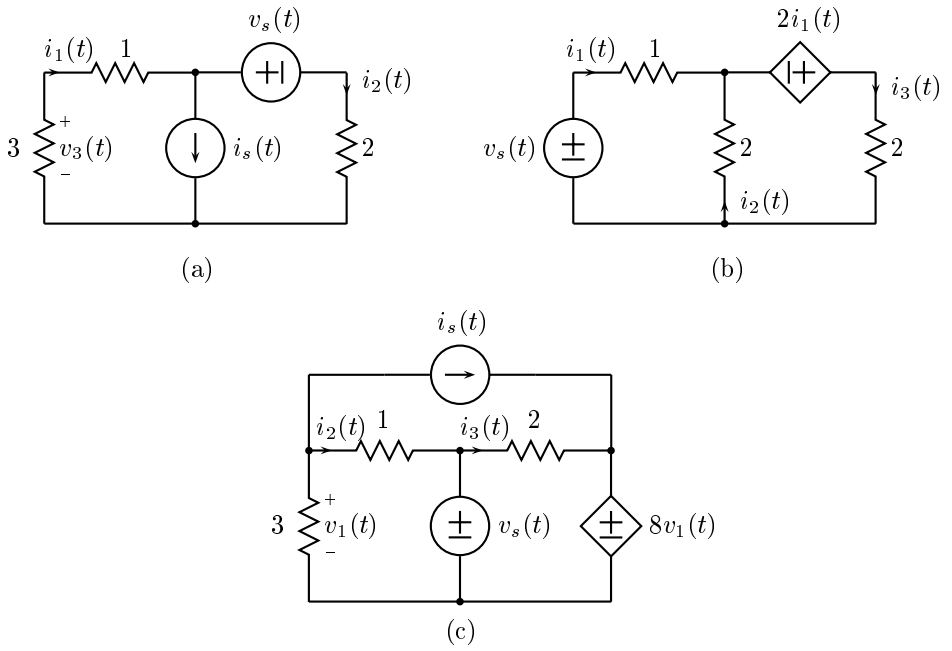


Figure 1: Networks for Problem 2.1.

(i.) Draw the basic network.

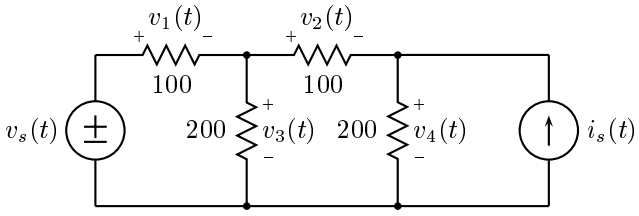
(ii.) Identify the closed paths in the original network that correspond to meshes in the basic network.

(iii.) Identify the closed surfaces in the original network that correspond to nodes in the basic network.

(b) Repeat for the network in (b).

(c) Repeat for the network in (c).

Problem 2.4:



(a) Determine the number of KCL and KVL equations that we will have to write in order to find all four voltages, $v_1(t)$, $v_2(t)$, $v_3(t)$, and $v_4(t)$.

(b) Write a complete set of linear equations that must be solved to find the equilibrium solution.

(c) Use MATLAB to find $v_1(t)$, $v_2(t)$, $v_3(t)$, and $v_4(t)$. Each voltage should be of the form

$$v_k(t) = a_k v_s(t) + b_k i_s(t).$$

Problem 2.5: (Irwin and Wu, problem 2.101.) For the network below, choose the values of R_{in} and R_o such that $v_o(t)$ is maximized. What is the resulting ratio $|v_o(t)/v_s(t)|$?