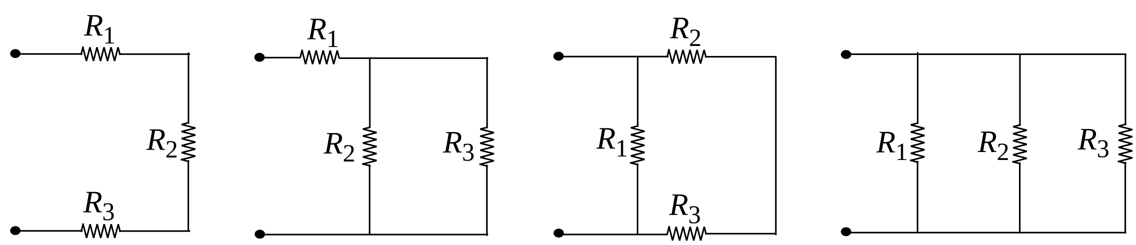
Massachusetts Institute of Technology
Department of Electrical Engineering and Computer Science

6.002 – Circuits & Electronics
Fall 2007

Homework #2
Handout S07-015

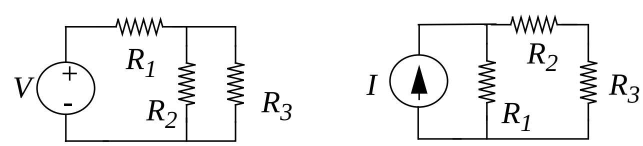
Helpful readings for this homework: Chapter 3. 13.3, 3.5-3.6.

Exercise 2.1: Determine the resistance of each network shown below as viewed from its port.



Network (A) Network (B) Network (C) Network (D)

Exercise 2.2: For both networks shown below, find the voltage across each resistor. (*Hint: make use of the results of Exercise 2.1.*)

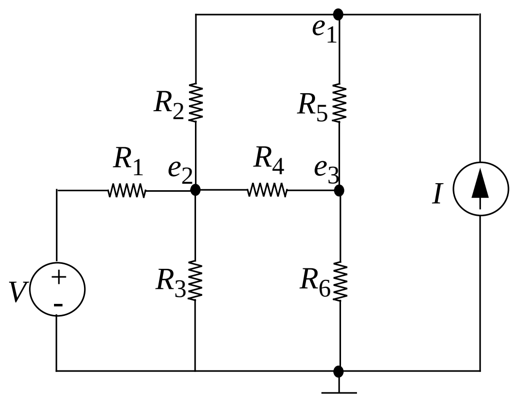


Network (A) Network (B)

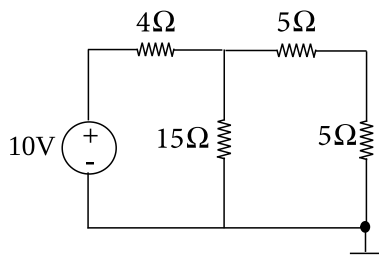
Exercise 2.3: Following the node method, develop a set of simultaneous equations for the network shown at the top of the following page that can be used to solve for the three unknown node voltages. Express these equations in the form

$$G \begin{bmatrix} e_1 \\ e_2 \\ e_3 \end{bmatrix} = S, \tag{1}$$

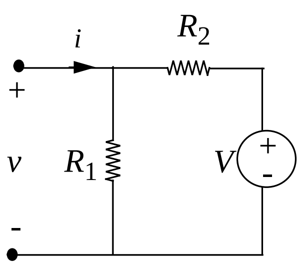
where G is a 3x3 matrix of conductance terms and S is a 3x1 vector of terms involving the sources. You need not solve the set of equations for the node voltages.



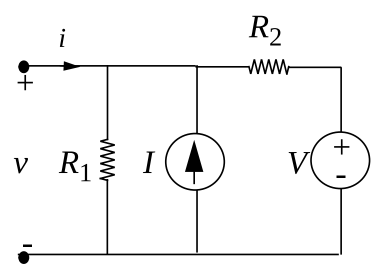
Exercise 2.4: Determine the power consumed by the 15Ω resistor in the network shown below. (*Hint: use the series/parallel simplification method shown in Section 2.4 of the course notes.*)



Problem 2.1: Find the Thevenin and Norton equivalents of the following networks, and graph their i–v relations as viewed from their ports. (*Hint: use superposition for Network B.*)



Network (A)



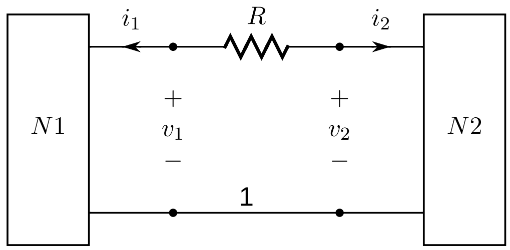
Network (B)

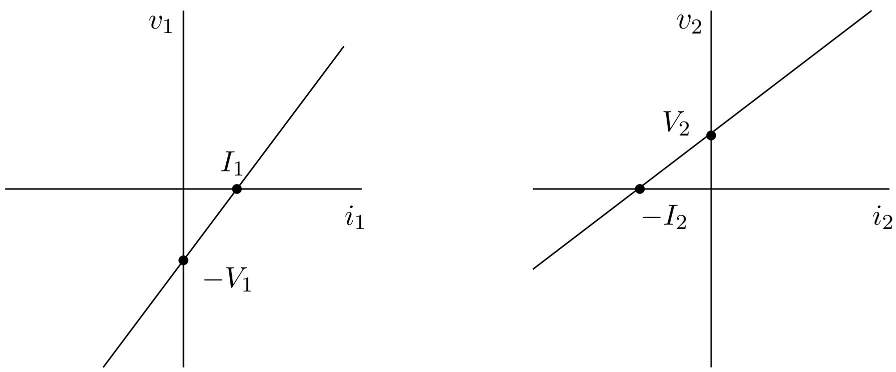
Problem 2.2: Problem 3.9 from Chapter 3 of A&L (page 187).

Problem 2.3: Two networks, N1 and N2, are described graphically in terms of their i–v relations, and connected together through a single resistor, as shown below.

(A) Find the Thevenin and Norton equivalents of N1 and N2.

(B) Find the voltages v_1 and v_2 that result from the interconnection of N1 and N2.





(a) Network 1 (N1) (b) Network 2 (N2)