Exercise 2-1: Determine the conductance of each network shown below as viewed from its port. Note that the resistors in each network are specified in terms of their conductances.

Exercise 2-2: For both networks shown below, determine the voltage across and the current through $R_3$.

Problem 2-1: Find the Thevenin and Norton equivalents of the following networks, and graph their $i-v$ relations as viewed at their ports.
Problem 2-2: This problem analyzes the network shown below by two methods. Note the definition of the reference node.

(a) Use the node method to analyze the network. First define the appropriate node voltages and branch currents. Second write the appropriate equations and solve for the node voltages.

(b) Use superposition to analyze the network. That is, superpose the two partial node voltages obtained with only single sources active to find the total node voltages. Remember that a zero-voltage source is a short circuit, and a zero-current source is an open circuit.

(c) Compare the solutions to Parts (A) and (B), and check their units. The two solutions should be the same.

Problem 2-3: Given the network shown below, find \( v_0 \) as a function of \( v_1 \), \( v_2 \) and \( v_3 \) assuming \( i_0 = 0 \). Hint: use superposition. Also, find the Thevenin equivalent of the network as viewed from its port. Finally, assume that the voltage sources can each take on only the values of \( 0 \) \( V \) or \( 3 \) \( V \), and determine \( v_0 \) for the 8 possible combinations of \( v_1 \), \( v_2 \) and \( v_3 \). Based on your analysis, of what electronic circuit might the network be a part?

Problem 2-4: Two networks, N1 and N2, are described 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 analytic expressions for the currents \( i_1 \) and \( i_2 \) that result from the interconnection of N1 and N2.