ECE 211 Fall 2003
PSpice Lab Two
**(Due 10/29/03 at the beginning of discussion.)**

Objectives:
In this PSpice lab, you will learn how to calculate a Thevenin voltage and resistance, how to run independent source sweeps and plot the results, how to run a parametric sweep and plot the results, and how to create and use an ideal op-amp. You should have already analyzed each circuit as a homework problem. Where possible, use your homework results to check that the PSpice results are correct.

Required Output:
For each problem:
1. For single runs, a schematic print out with node voltages and currents (from the analysis) labeled.
2. For sweeps, a graph of each sweep variable vs. the voltages or currents indicated below.
3. For all runs, the analysis output file (.out text file) for each problem.
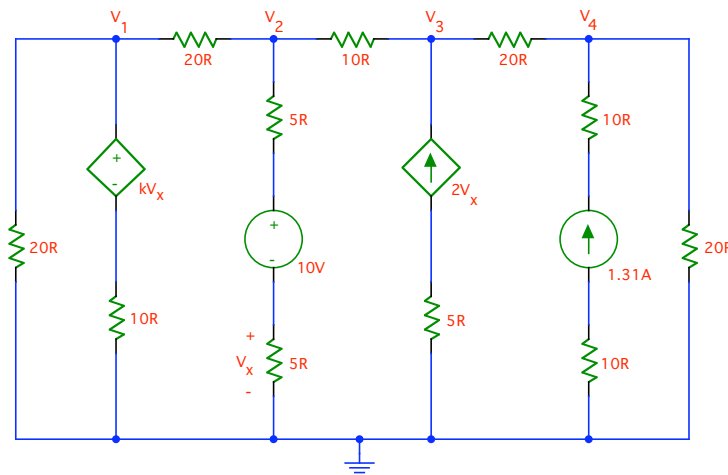
Problem 1
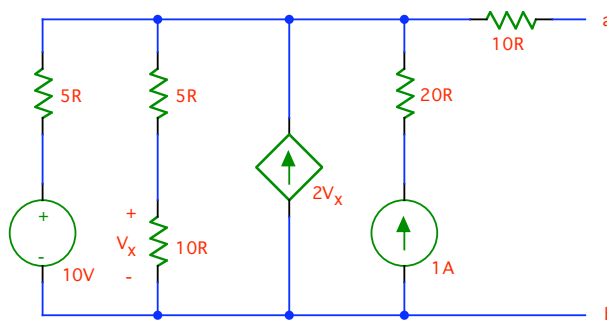
For the above circuit (homework 3, problem two):
1. Find the Thevenin equivalent as seen at terminals a-b.
    Calculate the open circuit (V_{oc}) voltage by inserting a relatively large resistor (1,000,000R) at the output terminal and running the analysis.
    Calculate the short circuit current (I_{sc}) by inserting a wire across the output terminal and running the analysis. Then calculate $R_{th} = V_{oc} / I_{sc}$.
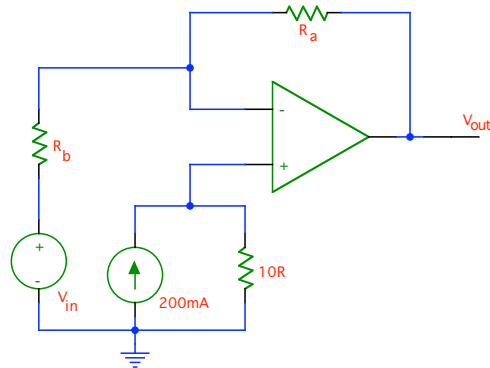
Problem 2

For the above circuit (homework 4, problem one):
1. Analyze the circuit using the three values of k you determined for V4 = 20V, 19.9V, and 20.1V or 20V, 19V, and 21V and show that your k's result in the correct values of V4.
2. Using the k for V4=20V, sweep* the independent voltage source 0-50V and plot V1, V2, V3, and V4 over that range.
3. Using the k for V4=20V, sweep* the independent current source 0-20A and plot V1, V2, V3, and V4 over that range.

*For help on how to do a DC sweep, refer to the revised PSpice tutorial (pages 22 and 23) available on the ECE211 web site.

Problem 3

For the above circuit (homework 4, problem two):
1. Analyze the circuit using the values from part b of the homework problem (using a simple DC bias analysis) and show that you get the correct Vout.
2. Using the values from part b of the homework problem (except Ra), do a parametric sweep of Ra:
   Add a resistance parameter named RESISTANCE.
   Replace Ra with a variable resistor and set its resistance to the parameter RESISTANCE.
   Setting up the solver to do a parametric sweep of RESISTANCE (Ra) from 0 to 100kR. Plot the results, Vout vs. RESISTANCE (Ra).

*For help on how to do this, refer to the revised PSpice tutorial (pages 24 -27) available on the ECE211 web site.