EECS 211 Circuits I
Fall Semester 2018
Assignment #8 Due 18 October 2018 (This is the Thursday after Fall Break)

Reading: Section 5.3 and Appendix 3 in Hayt/Kemmerly/Durbin

Do all of the Practice problems in the Reading assignment (but do not hand them in).

NOTE 1: Some of the problems below have an indicated method (e.g., superposition, source transform). For those problems, you must use the indicated method to solve the problem, but you may check your answers using any method. NOTE 2: Some of the problems direct you to perform some sort of a check on your work. This check must be done to receive full credit for the problem.

1. Use the circuit of Figure 5.69 for this problem.
   a. This part was to be done as part of last week’s assignment -- it is repeated here just for reference -- you should NOT work this part for this week’s assignment.

   First, determine the Thevenin equivalent of the network connected to $R_L$ using repeated source transforms and resistor combinations.

   b. This part is to be done for this week’s assignment.

   Now, remove $R_L$ and label the terminals that remain after removing $R_L$ as X and Y, with X on top. Then determine the Thevenin equivalent of the remaining network at terminals X and Y by first finding $V_{oc}$ (make the + reference at X) and $I_{sc}$ (in the proper arrangement with $V_{oc}$). Then use those values to determine the Thevenin equivalent. Be sure to label terminals X and Y on your Thevenin equivalent diagram.

   c. This part has been added for this week.

   What is the value of resistor $R_L$ that will maximize the power absorbed by that resistor?

2. Problem 5.32, p. 166. Thevenin equivalent for a network with multiple independent sources. The Thevenin equivalent should be found at the 2 terminals at the top, which should be labeled X and Y, with X on the left. Work this problem by first finding $V_{oc}$ (with + reference at X) and $I_{sc}$ (in the proper arrangement with $V_{oc}$). Then use those values to determine the Thevenin equivalent. Be sure to label terminals X and Y on your Thevenin equivalent diagram. Hint: Your answer should match the answer for the same problem from last week’s assignment, when you found the Thevenin equivalent using source transforms and element combinations. ALSO, add the following part to this problem: What is the value of the maximum power that can be delivered to a resistor connected between terminals X and Y?

3. Problem 5.36, p. 166. Practice finding Thevenin resistance using different methods. ALSO, add part (d) as follows: Find $R_{Th}$ using resistor combinations on the "dead" network.

4. Use the circuit of Figure 5.66 for this problem. Break the circuit just to the left of the 10 $\Omega$ resistor, so that Network B consists of the 10 $\Omega$ resistor and the 2 A current source and Network A consists of the 9 V independent source, the dependent voltage source, and the 11 $\Omega$ and 7$\Omega$ resistors. Note that the control variable for the dependent source ($I_1$) is in Network A along with its dependent source (as is required). Label the points of interconnection between Networks A and...
B as X and Y, with X on top.

a. Find the Norton equivalent of Network A using any method you choose. Be sure to label terminals X and Y on your Norton equivalent.

b. Connect the Norton equivalent to Network B and find the voltage across the 10 Ω resistor (+ reference on top).

c. Verify your result for the last part by analyzing the original circuit using any other technique of your choosing.

5. Problem 5.42, p. 168. Thevenin equivalent for a network with only a dependent source. Be sure to label terminals a and b on your Thevenin equivalent.

6. Problem 5.54, p. 170. Maximum power transfer for a network with independent and dependent source. ALSO, add the following part: Calculate the power absorbed by that resistor placed between a and b.