ELEC 225 Circuit Theory I Fall 2013

Homework Assignment #3 – due in BRKI 368 at 4:30 pm on Friday, Sept. 27, 2013
(1st revision 9/25/13; 2nd revision 9/26/13)

***Instructions, notes, and hints*:**

You may make reasonable assumptions and approximations in order to compensate for missing information, if any. Provide the details of all solutions, including important intermediate steps. You will not receive credit if you do not show your work.

Probs. 3.84 and 3.86: For more information on potentiometers, see pp. 43-44 in the textbook.

Prob. 3.86: Note that R_2 is always shorted out by the wire connected to the wiper.

Probs. 3.88: Be careful! The answer for this case (a Norton equivalent circuit, or NEC) is not the same as that for the similar TEC case that was discussed in class. However, it can be found without any analysis if you think carefully about it. Remember to show your work or thought process, though.

***Assignment*:**

Probs. 3.84, 3.86, and 3.88 in the textbook plus the problems below:

1. **[problem retracted 9/26/13]** Consider Prob. 3.86. For the potentiometer setting found in part b that results in the maximum power delivered to the load R_L, find the TEC seen by R_L. Explain whether or not the result you obtain makes sense.

2. A series connection of four AA batteries is used to supply 6 V to a small heater intended to be placed inside a jacket. As shown in the diagram below, several resistors are connected in parallel with the battery pack and are distributed throughout a large fabric pad worn next to the body. The battery itself is modeled by the TEC shown in the diagram. Resistance R_{int} is called the internal resistance; all batteries have some internal resistance that is related to their chemistry. How many resistors should be connected in parallel to maximize the amount of power transferred from the battery to the resistors to warm up the person? [Note: It is generally not a good idea to draw the maximum possible power from a battery. They are not designed to deliver maximum theoretical power, at least not continuously; if they do, they will become dangerously hot.]