**Physics 313** assignment for Thursday, Aug. 27, 2009:

**Reading:**
If needed, review basic DC circuit material from Serway (chapter summaries)

New topics from Scherz:
Resistive DC circuits and voltage dividers: 3.5 (through p. 317); also see Examples 1-3 on pp. 55-58
Thévenin model: 2.19.1 (Norton model, 2.19.2, is optional)
Safety: 14.1 (note that much of this pertains to higher-voltage circuits than we’ll be working with, but it’s still important to know)
Multimeters: 2.14 (note that the voltmeter in the middle part of Fig. 2.56 should be an ammeter), 14.3 (optional)

**Reading questions** will be sent out by email after class; answers are due by 11 am Thursday.

**Problems to hand in:**
1) a) Which of the three resistors in the circuit below dissipates the most power, and how much power does that resistor dissipate? Show your reasoning.

![Circuit Diagram](image)

b) Are ¼ W resistors OK in this circuit? Explain.

2) You want to use a voltmeter with an impedance of $R_V$ and an ammeter with an impedance of $R_A$, along with a DC power supply of voltage $V$, to determine the resistance of a resistor that has a true value of $R$.
   a) Sketch a circuit diagram for each of the two possible configurations you could use if you wanted to make simultaneous measurements of voltage and current in order to find $R$.
   b) For each of these configurations, derive an expression for the measured resistance—that is, find $R_m = V_m/I_m$, where $V_m$ is the measured voltage (the voltage across the voltmeter) and $I_m$ is the measured current (the current through the ammeter). Relate $V_m$ and $I_m$ to $V$, $R$, $R_V$, and $R_A$, and simplify so that your results for $R_m$ depend only on $R$, $R_V$, and $R_A$.
   c) What percentage error in measuring $R$ is made with each configuration if $R_V = 10$ R and $R_A = 0$ (ideal ammeter, not-so-ideal voltmeter)? What if $R_V = \infty$ and $R_A = 0.1$ R (ideal voltmeter, not-so-ideal ammeter)? Comment on your results.