HW #6 Due Feb 25 at the ***beginning*** of class.

READING: On Monday we start Ch. 20 on Magnetism. We are two days behind the Course Schedule posted on Physerver. Problems 27 and 31 from Ch. 19 on this HW are relevant to the exam. They are Kirchhoff"s Rules problems. For the exam you should be able to properly set up problems like these, but you will not be asked to solve the simultaneous equations. For the HW, you should solve the equations, either doing it the old fashioned way using substitution and elimination, or using the Matrix solving feature on your TI calculator, or using a program online like the one I used in class on Friday at www.akiti.ca/SimEqR12**Solver**.html

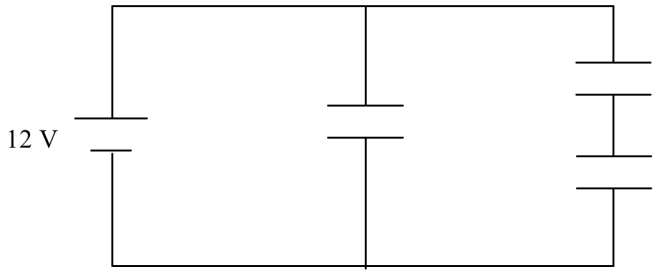
Please hand in the HW in two parts.

Part I:
Ch. 19 Question #19
Ch. 20 Question #6, 10
Ch. 19 Problems #27, 31

Part II:
Ch. 19 Problem 51
Ch. 20 Problem 10
Additional Problems 1, 2, and 3

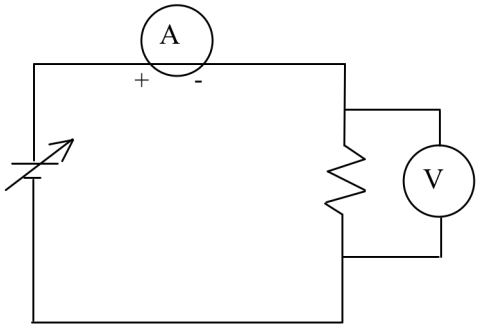
Additional Problems

1) Three capacitors are connected to a 12 V battery as shown below. The capacitor on the left is 2 μF. The two on the right are 3 μF and 4 μF.



What is the voltage across each capacitor? Hint: The capacitor on the left is trivial, but it is a little harder for the capacitors on the right. If you read the textbook you will realize that two capacitors in series have the same charge. First find Q, then find V across each.

2) In the lab last week you used the circuit shown on the next page to determine the resistance of a resistor, and it worked fine, but the value you obtained actually had a small error because the resistance of the ammeter used was not zero and the resistance of the voltmeter was not infinite. In this problem you will see how the error occurs.



Suppose that the ammeter has a resistance of 5 Ω, the voltmeter has a resistance of 100,000 Ω, and the resistor has an actual resistance of 2,800 Ω.

a) Calculate the equivalent resistance of the combination of the ammeter, the resistor and the voltmeter. Keep at least 4 sig. figs.

b) Suppose that the power supply is producing a potential difference of 12.0000V . What is the current leaving the power supply? Keep at least 4 sig. figs. Note that this is also the current going through the ammeter, so this is the current the ammeter will measure.

c) Determine the voltage drop across the resistor and the voltmeter. Keep at least 4 sig. fig. Note that this is the voltage that the voltmeter will measure.

d) Use your results from b) and c) to calculate the resistance of the resistor, to 4 sig. fig. Your result should be close to 2800 Ω, but a little bit low. This error is mainly due to the non-infinite resistance of the voltmeter. The non-zero resistance of the ammeter does not have much effect in this problem, but it might under different circumstances.

3) A 10.0 cm length of wire has a mass of 5.0 g and is connected to a battery by very light flexible leads. A magnetic field of 0.05 T is horizontal and perpendicular to the wire. Find the current necessary to float the wire, i.e. such that the magnetic force balances the weight of the wire.