PHYS 2102

Exam 2

Spring 2000

Dr. Aktash

Name :_____

SS # : _____

You have five questions: 20 points each.

This is a closed book exam. I understand I am not to use any notes or information other than on this exam sheet. I may use a pocket calculator but only for the purpose of numerical calculation. I accept the responsibility to know and observe the requirements of the UNC-Charlotte Code of Student Academic Integrity.

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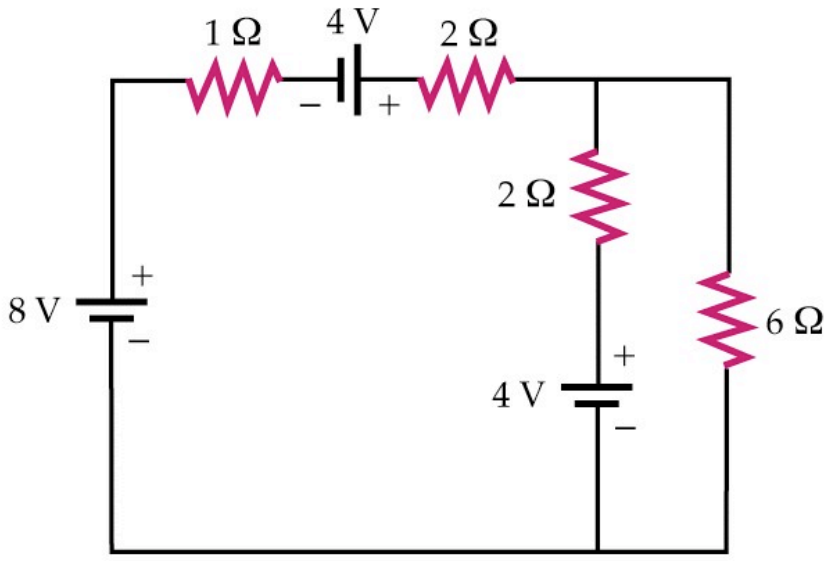
Signature

Good luck

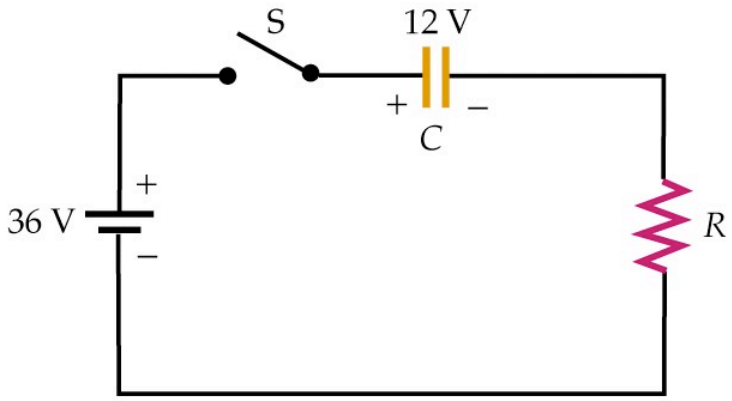
Show all of your work. Do not skip steps. First write down the relevant equations then substitute the numbers if necessary.

1. A copper wire of cross-sectional area 3.00×10^{-6} m^2 carries a currrent of 10.0 A. Find the drift speed of electrons in this wire. The density of copper is 8.95 g / cm^3, atomic mass of copper is 63.5 g / mol, Avogadro's number is 6.02×10^{23} atoms / mol. Assume that each copper atom contributes one free electron to the body.

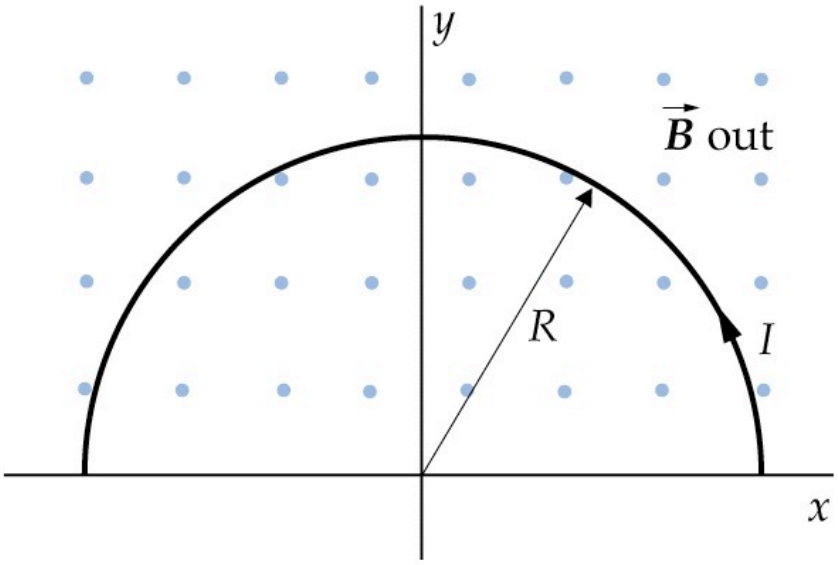
2. For the circuit in Figure below, find (a) the current in each resistor, (b) the power supplied by each emf, and (c) the power dissipated in each resistor.



3. In the circuit shown in Figure below, the capacitor has a capacitance of 2.5 μF and the resistor a resistance of 0.5 MΩ. Before the switch is closed, the potential drop across the capacitor is 12 V, as shown. Switch S is closed at t = 0. (a) What is the current in R immediately after S is closed? (b) At what time t is the voltage across the capacitor 24 V?



4. A current-carrying wire is bent into a semicircular loop of radius R that lies in the xy plane. There is a uniform magnetic field B = B**k** perpendicular to the plane of the loop Show that the force acting on the loop is F = 2IRB**j**. Where **i, j, k** are the unit vectors along x, y, and z directions respectively.



5. In Figure below, find the magnetic field at point P, which is at the common center of the two semicircular arcs.