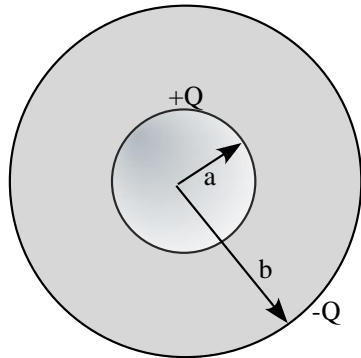Name : _____
Physics 4B/Exam 2
Winter 2003

1. Two concentric spherical conducting shells are separated by vacuum. The inner shell has total charge +Q and outer radius 'a' and the outer shell has charge –Q and inner radius 'b'
   a) Find the capacitance of this spherical capacitor. (5 pts)

   b) If the region between the spherical shells is filled with silicon with resistivity $\rho = 2300\ \Omega$ m, find the resistance between the shells assuming a = 10cm and b = 30 cm. (5 pts)

2. The figure below shows the voltage across a capacitor that is charging through a   4700
   Ω resistor. **Use the graph to determine**:   (10 pts)
   a) The battery voltage.
   b) The time constant.
   c) The capacitance of the capacitor.
   d) The maximum charge on capacitor.
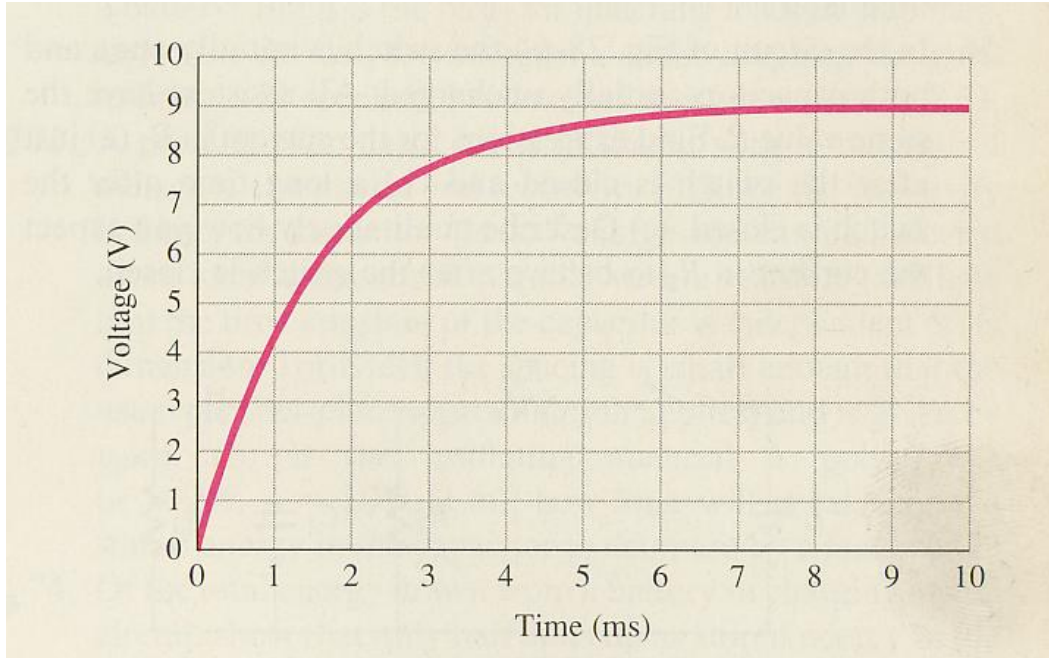
3. In the circuit below the switch is initially open and both capacitors initially uncharged. All resistors hace the same value R. (10 pts)
   a) Find the current through R_2 just after the switch is closed.
   b) Find the current through R_2 a long time after the switch has been closed.
   c) **DESCRIBE QUALITATIVELY** how you expect the current in R_3 to behave after the switch is closed.
   d) Draw a sketch of the graph of I_3 vs. t for the current through R_3 after the switch has been closed until a long time after it has been closed.
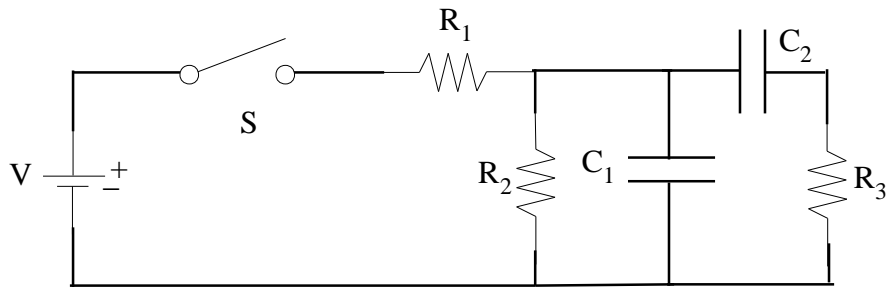
4. Consider the circuit below. (10 pts)
   a) What is the total number of currents in the circuit?
   b) Write down the required equations to solve for all the current in the cirucit.
   c) Assuming the current from 'a' **to** 'b' is + 0.385mA, find the currents in the rest of the circuit.
   d) Find the potential of point 'c' relative to point 'e'. Which point is at a higher potential?