1) 5 pts Resistor 1 has twice the resistance of resistor 2. The two are connected in parallel and a potential difference is maintained across their combination. The rate of energy dissipation in 1 is: answer=C
a) the same as that in 2
b) twice that in 2
c) half that in 2
d) four times that in 2
e) one-fourth that in 2

2) 5 pts Two wires made of different materials have the same uniform current density. They carry the same current only if: ANSWER=B
a) their lengths are the same
b) their cross sectional areas are the same
c) both their lengths and cross sectional areas are the same
d) their potential differences are the same
e) the electric fields in them are the same

3) 5 pts A battery is used to charge a parallel plate capacitor, after which it is disconnected. Then the plates are pulled apart to twice their original separation. This process will double the: ANSWER=C
a) capacitance
b) surface charge density on each plate
c) stored energy
d) electric field between the plates
e) charge on each plate
7 pts For the following circuit the switch is first closed so that the capacitor is charged up to the battery voltage. The switch is now opened. Write down (but do not solve) an equation that describes the charge on the capacitor as a function of time. ANSWER=> \( q/c+(R2+R3)\frac{dq}{dt}=0 \)

For the following circuit find the following:
1) 7pts  The current in the circuit. 20A
2) 8pts  If the potential at P=100V what is the potential at Q? -10V
3) 5 pts  Calculate the power dissipated by the 3 \( \Omega \) resistor  1200W.
4) 5 pts  Suppose I put another 2\( \Omega \) resistor in parallel with the one already in the circuit. What will the voltage drop across this resistor be? 25V

5 pts For the following circuit write the loop equation for the loop: abcdefghijka.
\[ V1-V2+I2R2-V3+I3R3-I4R4-I1R1=0 \]
18 pts For this problem assume we have a positively charged particle. What is the direction of B in the six regions? B is out, in, in, out, out, in of the page.

5 pts A proton is moving with at 20 m/s in a magnetic field with B=2 Tesla. Which of the following statements is true? a) is TRUE
   a) As the proton moves through the magnetic field its speed will remain constant. 
   b) The magnetic force exerted on the proton is parallel to its velocity.
   c) The magnetic force does work on the proton as it travels through the field.
   d) The magnetic force on the proton will be maximum when the velocity and magnetic field vectors have a 45° angle between them.
Refer to the circuit diagram below.

a) What is the equivalent capacitance of the circuit? (10 points) 21F
b) What is the charge on each capacitor? (10 points) 100C, 200C, 120C, 120C
c) What is the potential difference across the 15F capacitor? (5 points) 8V