Capacitor Discharge Calculations

1. A 10mF capacitor is charged to 5.0V and then discharged through a 1kΩ resistor. What is the charge on the capacitor:
    a. Before it is discharged

    b. After 10 seconds of discharging

    c. After 20 seconds of discharging

    What is the energy stored in the capacitor:

    a. Before it is discharged

    b. After 10 seconds of discharging

c. After 20 seconds of discharging

2. A 470µF capacitor is charged to a voltage of 3.0V and then discharged through a 20kΩ resistor.
    a. What is the 'time constant' for this circuit? Include the unit.

    b. What is the initial current when the discharge begins?

    c. What is the current after 1s?

    d. How long does it take for the current to fall to 1/e of its original value?

e. How long does it take for the current to fall to half its initial value?

3. A 1F capacitor is charged to a voltage of 5.5V. It is then discharged through a resistor.
    a. What is the charge on the capacitor just before it is discharged?

    b. After 20 seconds the charge on the capacitor has fallen to 3.0C. What is the resistance of the resistor?

    c. How long does it take for the voltage across the capacitor to fall
        i. from 5V to 4V?

ii. from 4V to 3V?

4. A capacitor is charged to 2.6V and then discharged through a 10kΩ resistor. After a minute the voltage across the capacitor has fallen to 1.6V. What is the capacitance of the capacitor?