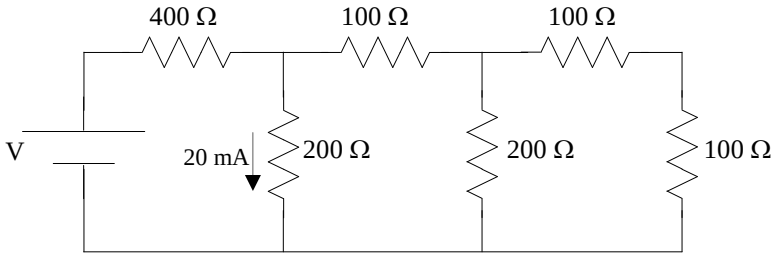
Physics 132, Midterm Exam #2, May 18, 2010 Page Score _____

Name: _____

Recitation Instructor: Draskovic Helal Ruggiero Wolfe

Problem 1 [25 points]. The current through the leftmost 200Ω resistor is 20 mA.

(a) [10 points]. Find the equivalent resistance of the resistors in the circuit.
(b) [15 points]. What is the battery voltage, V?



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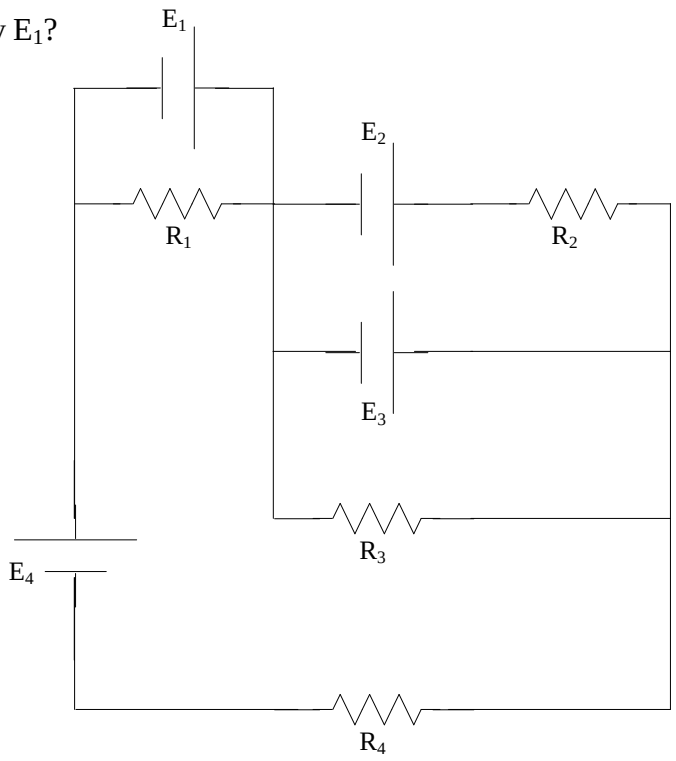
Problem 2 [25 points]. $E_1 = 20V$, $E_2 = 10V$, $E_3 = 5.0V$, $E_4 = 5.0V$ and $R_1 = R_2 = R_3 = R_4 = 1000\ \Omega$.
I am only asking questions about selected components. Read each question carefully so you solve for the correct quantity.

(a) [18 points] What is the current magnitude and direction through resistors R_1, R_2, and R_4.
Label your answers clearly, specifying the direction as either "left" or "right", as appropriate.

(b) [7 points] How much power is being supplied by battery E_1?



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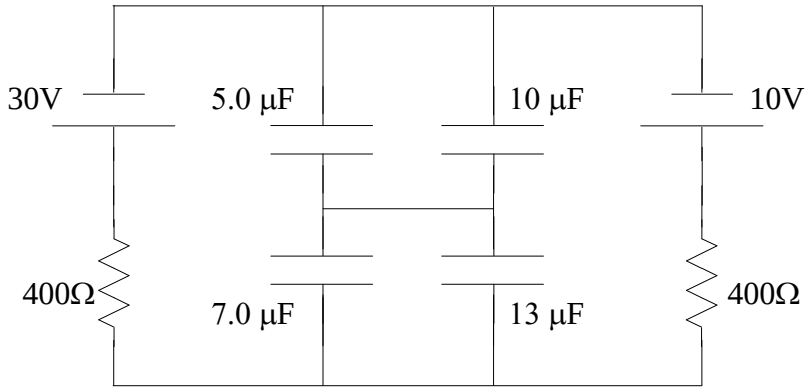
Problem 3 [25 points]. After the circuit is allowed to operate for a long time, how much energy is stored by all the capacitors?



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Multiple Choice Section. Circle the best answer to each question.

Problem 5 [15 points]. Three large, equally spaced, conducting plates are connected to batteries or ground as shown in cross-section in the figure. The plates are not directly connected to each other. An x-axis is given, as well. Note carefully the orientation and voltage of the batteries.

(a) [5 points]. The charge on the right side of the middle plate is: **positive** **zero** **negative**
(Hint: You might want to sketch the charge on the other plates, first.)

(b) [10 points]. Circle the graph which best represents E_x along the x-axis. The shaded regions of the graphs indicate where the conducting plates are.

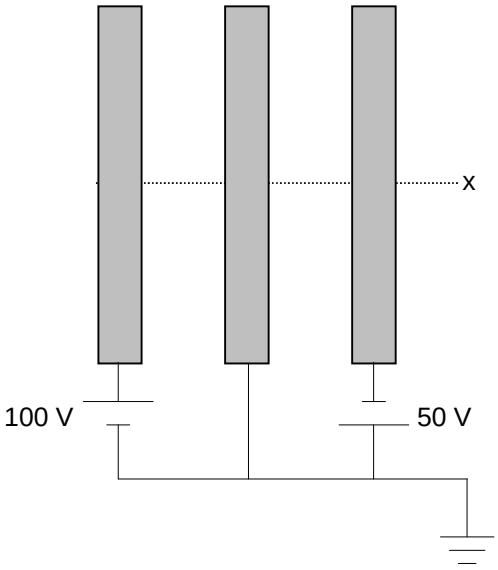
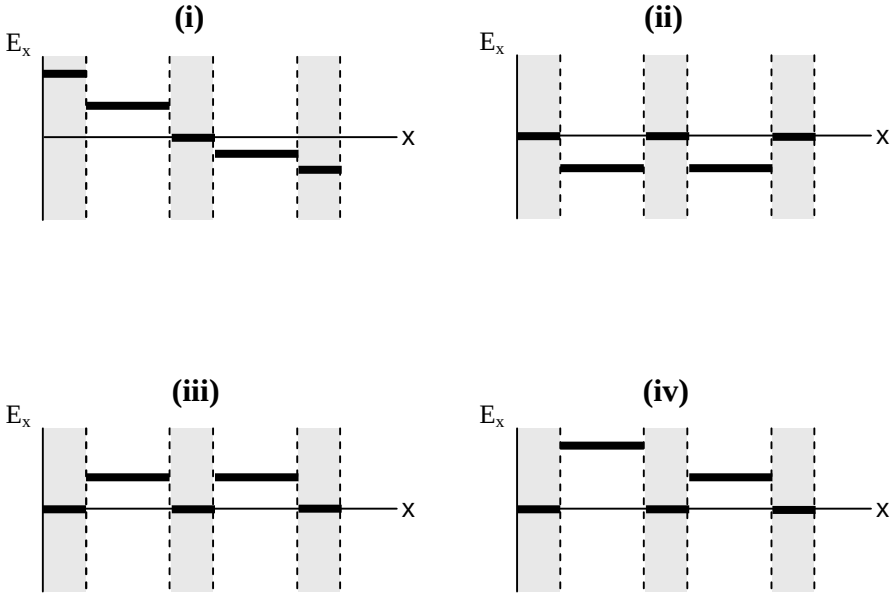
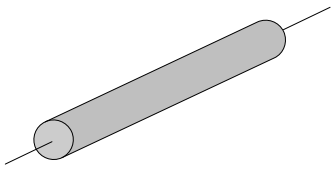


Figure showing the conducting plates (big grey rectangles).



Problem 6 [5 points]. Resistors A and B are both made of aluminum and in the shape of a cylinder. Resister A is 100 Ω. Resister B has twice the radius and twice the length of A. Its resistance is:

(a) 25 Ω **(a)** 50 Ω **(a)** 100 Ω **(a)** 200 Ω **(a)** 400 Ω



Problem 7 [5 points]. Circle each statement that is true for typical experience. More than one statement might be true, or none of them might be true.

"1 Ω is a small resistance."

"1 F is a small capacitance."

"1 V/m is a small electric field."