Homework Discussion, Week 4

Physics 1302 Dr. Andersen

Chapter 21

32.) a) Since the resistors are in series, solve $V = IR_{eq}$ for R_{eq}, then use R_{eq} to solve for R. b) Use $V = IR$ for each. c) If V were larger, and I remained the same (the textbook author doesn't explicitly say that in the statement of the problem, but that is what he had in mind), then from $V = IR$, the resistance must be larger.
Answers: a) 50 Ω, b) 1.8 V, 8.5 V, 7.8 V

37.) Start with the 4.8, 3,3, and 8.1 in parallel. That equivalent resistance is in series with the 6.3. That combination is in parallel with the 1.5 and 2.5.

51.)(*Important notice about this problem: the answers in the back of the book are wrong! The correct answers are given below.)* a) I chose I_1 to be the current through the 9.8 and 3.9 Ω resistors, I_2 to be the current through the 1.2 Ω resistor, and I_3 to be the current through the 6.7Ω resistor. I also chose to draw I_1 and I_3 to be entering node A on the diagram, and I_2 to be leaving the node. This gives a node equation at node A of:

$$I_1 + I_3 = I_2.$$

working clockwise around the left loop and the right loop gives loop equations:

$$12V - (3.9\Omega)I_1 - (1.2\Omega)I_2 - (9.8\Omega)I_1 = 0$$

and

$$(6.7\Omega)I_3 - 9.0V + (1.2\Omega)I_2 = 0.$$

These then need to be solved for the currents. b) Because point B is connected to the negative terminal of the 9 Volt battery, and point A is separated from point B by the 1.2 Ω resistor, point A must be at a higher potential. c) Note that the potential difference between A and B is just the potential difference across the 1.2 Ω resistor, so that the potential difference is just $(1.2\Omega)I_2$.
Answers a) $I_1 = 0.72\ A$, $I_2 = 1.75\ A$, $I_3 = 1.03\ A$. c) 2.1 Volts.

56.) a) Since the capacitors are in parallel, add the capacitances to get the equivalent capacitance. b) Because they are connected in parallel, the potential difference across each capacitor is equal. Since $Q = CV$, the capacitor

with the larger capacitance will be holding more charge. c) Plug and chug in $Q = CV$.
Answer: a) 23 μF c) 90 μC and 180 μC.