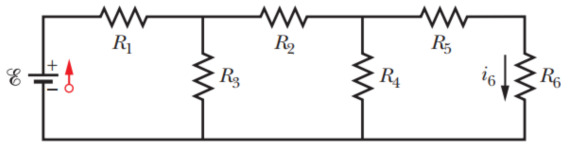
Assignment V, PHYS 112 (General Physics II)
Fall 2020
Due via pdf upload to OAKS prior to Friday, September 25th at 10:00 AM

General instructions:
For this, and all other homework assignments, please turn in your solutions with all supporting work; answers without supporting work will not earn credit. You do not need to upload the sheet with the questions on it, but please clearly number your problems and circle or box your final answers. I encourage you to collaborate with classmates to discuss how to approach a particular question, but the mathematical steps to generate your final answer on your submitted work should be your own. If I see the same simple mistake on multiple homework assignments, I will take off more points for that error than I normally would. Please include *words* in your answers. When you get answer keys back from me, you'll see that there are explanations, ideas, commentary, and thought processes included – not just a set of equations one after another. Finally, please ensure that all numerical answers have units.

1. A parallel plate capacitor is made out of two flat plats that each have dimensions of 5 mm x 5 mm and are separated by a distance of 10 nm.
   a) What is the capacitance of this (air-filled) capacitor?
   b) If the capacitor is hooked up to a source that forces the potential difference between the plates to be 120 V, what is the net surface charge density σ on the negative plate?

2. Consider the schematic below. Let all resistors have a resistance of 200Ω, and let the battery have $\mathcal{E} = 20$ V. Find the current through R_6.



3. In the figure below, the batteries have $\mathcal{E}_1 = 500$V, $\mathcal{E}_2 = 700$V, $R_1 = 100\Omega$, $R_2 = 500\Omega$, and $R_3 = 1000\Omega$. Find the current, voltage drop, and power consumption of each resistor.