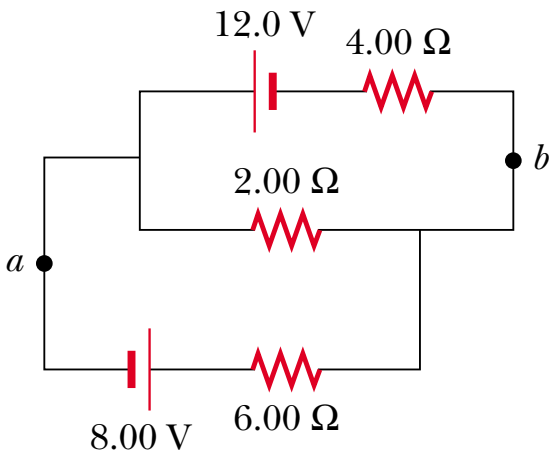

b

Figure 1: Problem 1.

Prof. Anchordoqui

Problems set # 7 **Physics 167** March 28, 2023

1. For the circuit shown in Fig. 1, calculate *(i)* the current in the 2.00 Ω resistor and *(ii)* the potential difference between points a and b.

2. The heating element of an electric oven is designed to produce 3.3 kW of heat when connected to a 240-V source. What must be the resistance of the element?

3. A heater coil connected to a 240-V_{rms} AC line has a resistance of 38 Ω. *(i)* What is the average power used? *(ii)* What are the maximum and minimum values of the instantaneous power?

4. At a point high in the Earth's atmosphere, He^{2+} ions in a concentration of 2.4×10^{12} m^{-3} are moving due north at a speed of 2.0×10^6 m/s. In addition, a 7.0×10^{11} m^{-3} concentration of O_2^- ions is moving due south at a speed of 6.2×10^6 m/s. Determine the magnitude and direction of the net current passing through unit area A/m^2.

5. Consider the circuit shown in Fig. 2, with the start up switch T_1 open (for a long time). Now, close the switch and wait for a while. What is the change in the total charge of the capacitor if $V_2 > V_1$?

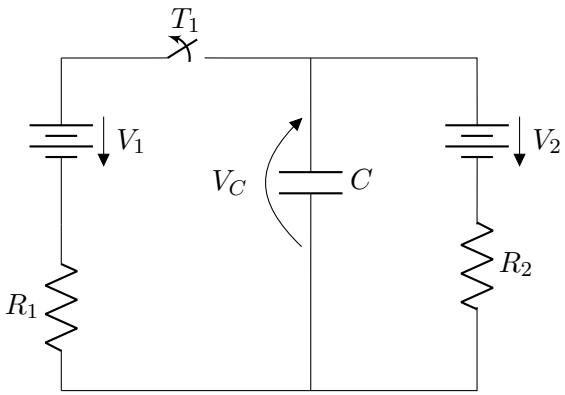

Figure 2: Problem 5.