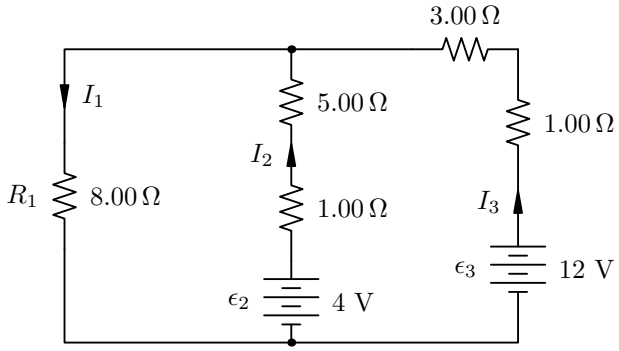
Recitation 6

Chapter 21

Problem 35. Determine the current in each branch of the circuit shown in Figure P21.35.



Problem 38. The following equations describe an electric circuit:

$$-(220\Omega)I_1 + 5.80\text{ V} - (370\Omega)I_2 = 0 \quad (1)$$

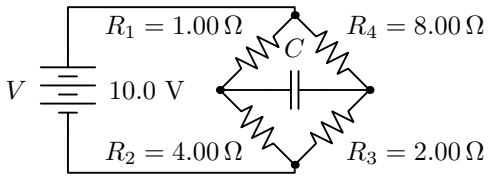
$$(370\Omega)I_2 + (150\Omega)I_3 - 3.10\text{ V} = 0 \quad (2)$$

$$I_1 + I_3 - I_2 = 0 \quad (3)$$

(a) Draw a diagram of the circuit. (b) Calculate the unknowns and identify the physical meaning of each unknown.

Problem 42. A $C = 2.00\ \mu$F capacitor with an intial charge of $Q = 5.10\ \mu$C is discharged through an $R = 1.30\Omega$ resistor. (a) Calculate the current in the resistor $t_a = 9.00\ \mu$s after the resistor is connected across the terminals of the capacitor. (b) What charge remains on the capacitor after $t_b = 8.00\ \mu$s? (c) What is the maximum current in the resistor?

Problem 45. The circuit in Figure P21.45 has been connected for a long time. (a) What is the voltage V_c across the capacitor? (b) If the battery is disconnected, how long does it take the capacitor to discharge to $V_c' = 1/10 \cdot V$?



Problem 53. An electric heater is rated at $P_H = 1500$ W, a toaster at $P_T = 750$ W, and an electric grill at $P_G = 1000$ W. The three appliances are connected to a common $V = 120$ V household circuit. (a) How much current does each draw? (b) Is a circuit with a $V_{max} = 25.0$ A circuit breaker sufficient in this situation? Explain your answer.

Problem 58. A battery with emf ϵ is used to charge a capacitor C through a resistor R as shown in Figure 21.25. Show that half the energy supplied by the battery appears as internal energy in the resistor and that half is stored in the capacitor.