1. There are 50 turns in the primary coil of a transformer. The same transformer has 250 turns in the secondary coil.
   a. If 12 Volts AC is applied to the primary coil, what will be the voltage coming out of the secondary coil?
   b. A lightbulb is attached to the secondary coil while (as was the case in the previous part) 12 Volts AC is applied to the primary coil. If the current in the primary coil is 5 A, how much current flows through the secondary coil?
   c. If 12 Volts DC is applied to the primary coil, what will be the voltage coming out of the secondary coil?

2. The rear defroster of your car operates on a current of 5A. If the voltage drop across it is 10V, how much power is it consuming as it melts the frost?

3. A 2500 Ω heating filament is subjected to a voltage drop of 100 V.
   a. How much current will flow through it?
   b. Using your answer to part (a), how much power will the heating element consume?

4. One type of microphone has a permanent magnet and a coil of wire that move relative to one another in response to sound waves. Why is the current in the coil related to the motion?

5. A house is equipped with a lightening rod and a positively charged cloud passes overhead.
   a. What type of charge (positive or negative) accumulates on the lightening rod?
   b. How is it that the lightening rod decreases the chance that the house will be struck by lightening?

6. On electric motors.
   a. You cannot make an electric motor using direct current and electromagnets without using switches. Why?
   b. Explain why an AC synchronous motor always spins at either 60 Hz or at an integer fraction of that rate if the rotor has multiple pairs of poles.

7. When you swipe a credit or debit card on a card reader, why is it important to do so relatively quickly?