You are allowed to refer to your textbook for formulas. However, please refrain from checking your notes or information in your text to complete the following questions unless you are unable to solve them.

1. A neutral atom would have how many more protons than electrons?  
   A positive atom would have how many more protons than electrons?  
   A negative atom would have more protons present or electrons present?

2. According to Coulomb’s Law, if there are two electrons with equal charge next to each other at a distance of 10 pm (1x10^{-12} m) exerts a certain amount of force. By what factor is the force affected by the two electrons if the distance were to increase to 50 pm (5x10^{-12} m)?

3. True/False: In an electric field, the force on a negatively charged atom is parallel and in the direction of the electric field.

4. True/False: When observing a negatively charged atom, the electric field lines emitted by that negative charged atom are facing away from the atom.

5. Consider the two currents:

   ![Current Diagrams]

   * Draw the direction of the current, identify what type of current each one has, other than the unit of Ampere, what other units can current possess? What is the current at each light bulb (resistor), what is the resistance at each light bulb, which of the above diagrams emits the brightest light? Whose law are you using to perform these calculations?

6. True/False: The lower the temperature of a wire, the higher its resistance.  
   The thicker a wire is, the higher its resistance  
   The shorter the wire is, the higher its resistance

7. A device is consuming 900 Joules/second while operating on 45V. What is the current passing through this device?

8. The same device as above operates for 3 minutes, how much energy has it used up?

9. True/False: An alternating current (AC) device oscillates in current levels as time goes on, producing a sinusoidal wave (“sine wave”).

10. True/False: An alternating current (AC) device has current flowing in only one direction.