1. Describe the following concepts (do not use equations, use only words):

   Action-at-a-distance

   Field (in particular Electric field)

   Resistivity

   Capacitance

2. A long rod of plastic of radius a is has a charge of λ coulombs per unit length uniformly distributed over its volume. The rod is surrounded by a concentric cylinder of sheet metal of radius b with a charge $-\lambda$ coulombs per unit length on its interior surface.

   (a) What is the energy density (as a function of radius) in the space between the rod and the cylinder

   (b) What is the energy density in the volume of the rod?

   (c) What is the total electri energy per unit length?

   (d) If the inside plastic is replace by a metal, how would your results to parts (a)-(c) will be modified?

   (e) In th configuration of part (d), what is the capacitance per unit length?
   (Modified from H. C. Ohanian, "Physics" Ch. 26, Pr.29)

3. H. C. Ohanian, "Physics," Ch. 27, Pr. 28, the problem that starts with "A spherical capacitor consists of two concentric..."

4. H. C. Ohanian, "Physics," Ch. 27, Pr. 29, the problem that starts with "In a semiconductor with impurity..."

5. A solid truncated cone is made of a material of resistivity ρ. The cone has a height h, a radius a at one end, and a radius b at the other end. Derive a formula for the resistance of this cone.
   (H. C. Ohanian, "Physics," Ch. 28, Pr.29)