Physics 200

Chapter 25 Electric Potential (Homework)

1. Three charges, Q, are located at the vertices of an equilateral triangle that is length, a, on a side. Calculate the electric potential energy of the system.

2. Four charges, Q, are located at the corners of a square that is length, a, on a side. Calculate the electric potential energy of the system.

3. Two electric charges, q and Q, are separated by a distance, a. Determine the electric potential at the midpoint between them.

4. Three charges, Q, are at the vertices of an equilateral triangle that is length, a, on a side. Calculate the electric potential at the midpoint of one of the sides.

5. Four charges, Q, are located at the corners of a square that is length, a, on a side. Calculate the electric potential at the center of the square.

6. A non-uniformly charged ($\lambda = \beta x$) rod with length, L, lies on the x-axis with its left end at the origin. Calculate the electric potential at the location (- a, 0).

7. A non-conducting rod with charge density, λ, is bent into a semicircle of radius, a. What is the electric potential at the center of curvature?

8. A thin line of positive charge is bent into a semicircle of radius, a. The linear charge density along the semicircle is given by $\lambda = \beta \cos \theta$. Calculate the electric potential at the center of curvature. (θ is zero at the midpoint of the semicircle.)

9. Calculate the electric potential at the point (L/2, a) if a non-uniformly charged rod lies on the x- axis with one end at the origin and the other end at (L, 0). The charge density is given by $\lambda = \beta x$.

10. A circular washer (inner radius, a, and outer radius, b) is positioned so that its center is at the origin and the x-axis is perpendicular to the plane of the washer. If the washer has a non-uniform charge density, $\sigma = \alpha / r$, on its right-hand surface what is the electric potential at the location, (D, 0).