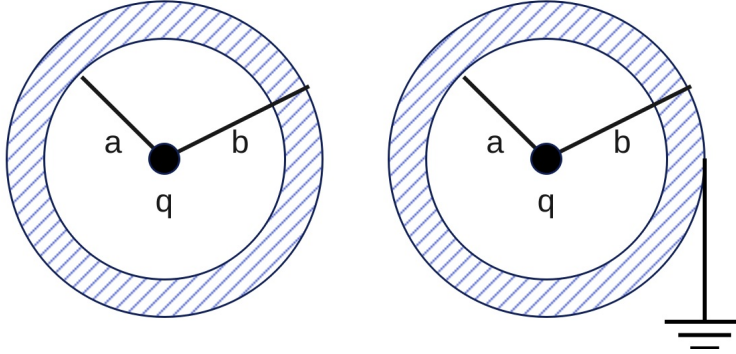


Electrical Potential and Conductors

Full Name, Period:

due: x/xx

1. Consider 4 uniformly charged thin wires of length l carrying linear charge density λ arranged into a square. Find the potential at the center of the square.
2. Find the electrical potential a distance r from the center of a thin insulating spherical shell of radius a with surface charge density σ . Do this for $r < a$, and $r > a$.
3. A conducting spherical shell of inner radius a and outer radius b has a charge q placed at its center. The conductor has no net charge. See first diagram below.



- (a) Find the surface charge on the inner and outer surface of the conductor. Briefly explain your answers.
 - (b) Find the field everywhere in space. Sketch the graph.
 - (c) Find the potential everywhere in space. Sketch the graph.
 - (d) The outside of the conductor is grounded as in the second diagram. How does this change your previous responses?
4. Consider a pair of concentric rings with radius r_1 and $r_2 = 2r_1$ that have linear charge densities λ (for r_1) and $-\lambda$ (for r_2).
 - (a) Find the potential at a point z above the rings along the axis.
 - (b) Find the electric field at a point z above the rings along the axis.
 5. Consider an infinite insulating wire with charge density λ , oriented along the x axis, and a second infinite wire, with charge density $-\lambda$ oriented along the y axis. They meet at the origin. Find the potential at a point p that lies along the z axis.