CLASSICAL ELECTRODYNAMICS I

Homework Set 2

September 22, 2017

1. A grounded conducting spherical shell of radius R is located with its center at the origin. A point charge q is located inside of the shell at a distance a from the center of the shell. Use the method of images to find the electrostatic potential everywhere inside the shell. As a special case, give an explicit formula for the potential when q is located at the center of the shell.

2. A grounded spherical conductor of radius R is located with its center at the origin. Outside the sphere, a uniformly charged thin ring with radius a and total charge Q is centered on the z axis such that the ring lies in the $z = b$ plane. Use the method of images to find the potential $\Phi(z)$ at all points on the z axis.

3. A point charge q is located at distance d from an infinite conducting plane held at zero potential. Use the method of images to find the surface-charge density induced on the plane.