Classical Electrodynamics (Physics course 503)

Problem set #3

Due date: 6pm, Mar 20 (Tue), 2018

Submission: HW box in physics building.

***1.*** An insulated conducting cylinder of radius a with charge per unit length q/l on it has its axis parallel to and a distance d away from a conducting plane. What is the potential of the cylinder relative to the plane?

***2.*** Charge q located on an infinite grounded conducting plane at distance d.

(a) using method of image, calculate the surface charge density induced on the plane, and plot it.

(b) There is another approach to calculate the surface charge density. The total field of the system is from the charge q and the surface charge density. Inside of the conductor, this field must be zero. From this fact, calculate the surface charge density.

(c) Find the work necessary to remove the charge q to infinity. When electron is located at 1 angstrom on the surface, calculate the work.

***3.*** Jackson 1.14

***4.*** Jackson 1.15