VE230 Assignment 2

Issue date: October 30th, 2017

Due date: November 6th, 2017

Pb#1 (15%)

Each of three charged spheres of radius *a*, one conducting, one having a uniform charge density within its volume, and one having a spherically symmetric charge density that varies radially as r^n ($n > -3$), has a total charge Q.

1) Calculate the electric fields both inside and outside each sphere.
2) Sketch the behavior of the fields as a function of radius for the first two spheres, and for the third with $n = -2$ and $n = +2$

Pb#2 (15%)

How should the charge density within a solid sphere vary with distance from the center in order that the magnitude of the electric field in the sphere be constant?

Pb#3 (20%)

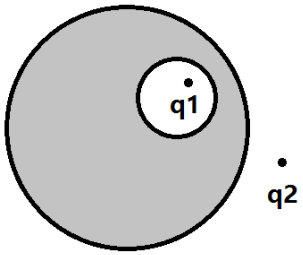
In a certain region, if there is uniform electric field. Argue that there is no charge anywhere in that region.

Pb#4 (15%)

We use a point charge $q<0$ to measure the electric field of a conductor balls with charge $Q > 0$. The result is E_0. If the q is not small enough relatively to Q. What will be the relationship between the magnitude of electric field we want and the measured one? (bigger, equal or smaller)

Pb#5 (5%)

There is a spherical cavity inside a neutral conductor ball. When we slowly move q_1, will the electric force on the q_2 change?



Pb#6 (10%)

A point charge q is placed at distance d from a grounded infinite large conductor plane. Find the charge distribution on the conductor plane.

Pb#7 (20%)

A point charge q is placed at distance d from a grounded infinite large conductor plane. If I want to pull this point charge to infinite, how much work should I do?