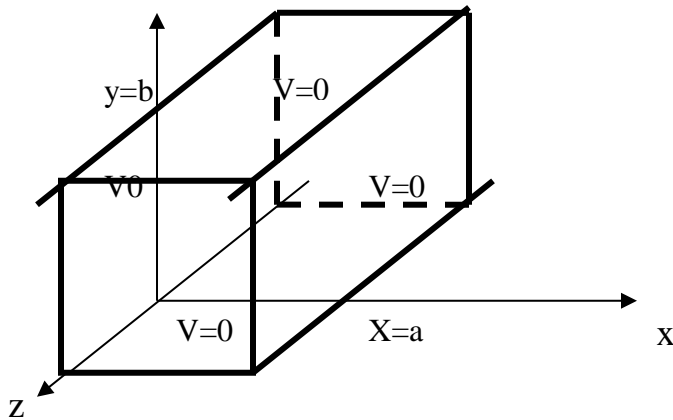


Assignment 3

Posted on Feb 26th, Due on March 8th.

1. A point charge q is located at a distance d from the center of a grounded conducting sphere with a radius a . Find
 - (a) the potential and electric field of all the space
 - (b) the surface charge on the sphere
 - (c) The force acting on the point charge
2. Prove that the potential is unique for Laplace's equation if the electric field at boundary is given.
3. For an infinite long rectangular tube (axb, along z axis) with the boundary conditions below, what's the potential inside? ($V=0$ on all the surface except $V=V_0$ at the surface at $X=0$)



4. The potential at the surface of a sphere (radius= R) is given by $V_0 = k \cos 3\theta$, where k is a constant. Find the potential inside and outside of the sphere, as well as the surface charge density on the sphere. (Assume there is no charge inside or outside of the sphere.)