

**PHYSICS 110A, WINTER 2017**  
**ELECTRICITY AND MAGNETISM**

**Assignment Eight, Due Monday, March 19, noon.**

[1.] A point charge  $q$  is located at position  $(x, y, z) = (0, 0, d)$ . The dielectric constant is  $\epsilon_1$  for  $z > 0$  and  $\epsilon_2$  for  $z < 0$ . Compute the potential and electric fields at all points in space. Sketch the electric field lines. Hint: The method of images is useful, as in the problem of a point charge near an infinite metallic plane. However, note the boundary conditions are different from that situation, where the electric field must be perpendicular to the surface.

[2.] Griffiths 4-02.

[3.] Griffiths 4-11.

[4.] Griffiths 4-18.

[5.] Griffiths 4-26.

[6.] Griffiths 4-31.

[7.] Extra credit: A sphere of dielectric constant  $\epsilon$  is placed in a uniform external electric field. Compute the potential everywhere in space, as well as the volume(surface) polarization charges within(on) the sphere.