Physics 321, Autumn Quarter 2015
Electrodynamics: Homework Assignment 9

(a) Turn in all problems and clearly note all constants and assumptions you use. (1-point penalty each otherwise)

(b) Use 8½ x 11 paper & staple (1-point penalty each otherwise)

Due 9:30 am Thursday December 3

1. Consider a linear dielectric material having dielectric constant ε. Suppose the electric field in the neighborhood of some point inside the material is **E**. Find the force per unit volume exerted on the dielectric in the neighborhood of this point.

2. A thin disk of radius *R* and height *L* carries a constant axial polarization **P**. (a) Sketch the lines of **E**. (b) Find the bound charge. (c) Why is the dipole moment at large distances from the disk that of two separated charges; find the magnitude of one of these charges and the separation of the charges.

3. A sphere is uniformly filled with material having constant polarization **P**. Find the dipole moment of the sphere.

4. How much work is required to bring two charges +Q and –Q from infinity to a very small separation d in the neighborhood of an external electric field **E**?

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