Lesson #23: Bound Charge
Electric Displacement

Name: _____

Study sections 4.2-4.3 and answer the following questions (be sure to show / explain your work).

1. A sphere of radius *R* has a polarization $\vec{P}(\vec{r}) = k\vec{r}$ where *k* is some constant and $\vec{r}$ is the usual position vector from the center. Calculate the bound charges σ_b and ρ_b.

2. Using your answers from 1, find the electric field inside and outside the sphere. (Hint: this is a simple Gauss's law problem.)

3. The electric field, both inside and outside the sphere, should make sense to you—explain why.

4. What is the electric displacement inside the sphere? Outside the sphere?

5. What is the difference between the "microscopic" field and the "macroscopic" field inside a material?