

PHY102: Assignment 6

1. A sphere of radius R carries a polarization

$$\vec{P}(r) = k \vec{r},$$

where k is a constant and \vec{r} is the vector from the center.

- (a) Calculate the bound charges σ_b and ρ_b .
 - (b) Find the field inside and outside the sphere.
2. A metal sphere of radius a carries a charge Q . It is surrounded, out to radius b , by a linear dielectric material of permittivity ϵ . Find the potential at the center (relative to infinity).
 3. A parallel plate capacitor is filled with insulating material of dielectric constant ϵ . Calculate the capacitance.