

姓名：_____ 學號：_____ 系級：_____

Problem 1: (50%)

A dipole \mathbf{p} is a distance r from a point charge q , and oriented so that \mathbf{p} makes an angle with the vector \mathbf{r} from q to \mathbf{p} .

- (a) Calculate the electric field of a dipole. (15 %)
- (b) What is the force on \mathbf{p} ? (25 %)
- (c) What is the force on q ? (10 %)

Problem 2: (50%)

A sphere of radius R carries a polarization

$$\mathbf{P}(\mathbf{r}) = k\mathbf{r}$$

Where k is a constant and \mathbf{r} is the vector from the center.

- (a) Calculate the bound charges σ_b and ρ_b . (15 %, 15 %)
- (b) Find the electric field inside and outside the sphere. (15 %, 5 %)