Exam 1 PH361 Name

1. Write an integral expression for the energy stored in a uniformly charged sphere of radius R and charge q using the energy density $\varepsilon_0 E^2/2$ (use the appropriate values for E).

2. A dipole \overrightarrow{p} is a distance r from a point charge q, and oriented so that \overrightarrow{p} makes an angle θ with the vector \overrightarrow{r} from q to \overrightarrow{p} . Write the initial step in obtaining the expression for the force on \overrightarrow{p} . I don't want to see a calculation beyond this first step.

3. Derive an expression for the change in the perpendicular component of the electric field across a boundary with charge density σ .

4. Explain how we calculate fields in matter.