## 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 $\vec{p}$ is a distance r from a point charge q , and oriented so that $\vec{p}$ makes an angle $\theta$ with the vector $\vec{r}$ from q to $\vec{p}$. Write the initial step in obtaining the expression for the force on $\vec{p}$. 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 $\sigma$.
4. Explain how we calculate fields in matter.
