Name: ___Key_____ Section _____
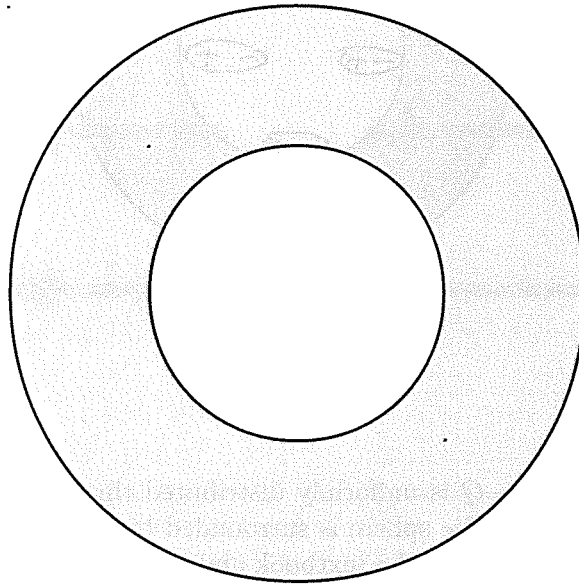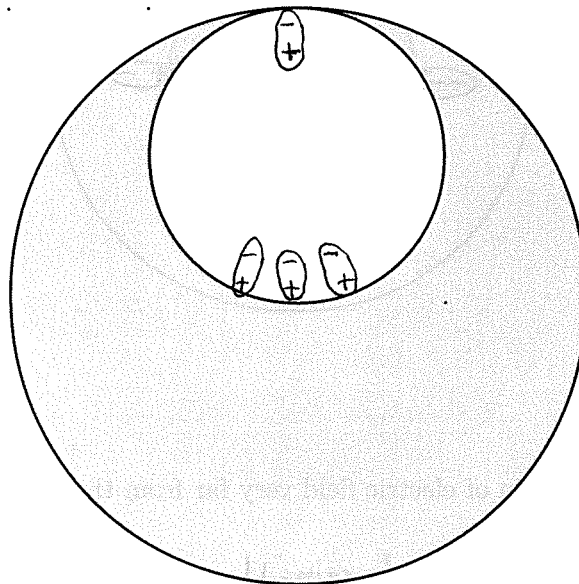
1. (*25 points*) A negative charge $-Q$ is uniformly distributed throughout a plastic shell represented by the shaded area on the diagram. The shell surrounds a solid, *neutral*, spherical piece of plastic. Draw the polarization of the neutral solid sphere. If there is no polarization, explain why this is so. Use the diagrammatic conventions used in the textbook and in class. For example, "+" and "-" are used to represent charge, neutral objects have an equal number of "+" and "-", dipoles are represented by an ellipse with a "+" at one end and a "-" at the other.
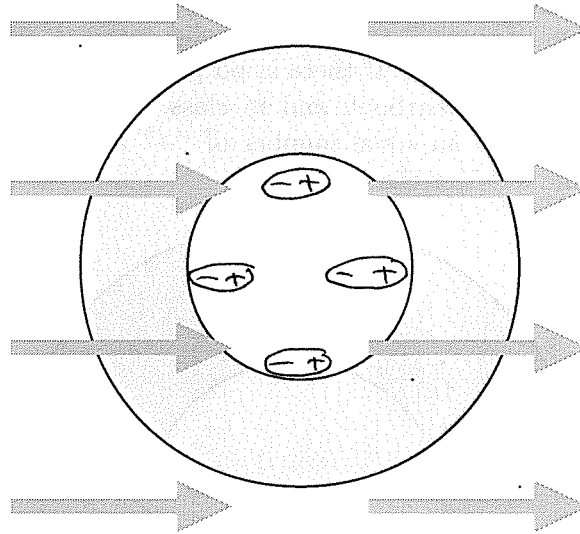
No polarization

$\overline{E} = 0$ inside
neutral
solid
sphere

2. (*25 points*) A negative charge $-Q$ is uniformly distributed throughout a plastic shell represented by the shaded area on the diagram. The shell surrounds a solid, *neutral*, spherical piece of plastic. Using the diagrammatic conventions discussed in the textbook and in class, draw the polarization of the neutral solid sphere. If there is no polarization, explain why this is so.

3. (*25 points*) A negative charge $-Q$ is uniformly distributed throughout a plastic shell represented by the shaded area on the diagram. The shell surrounds a solid, *neutral*, spherical piece of plastic. Everywhere in space is a uniform electric field that points to the right as indicated in the diagram. Using the diagrammatic conventions discussed in the textbook and in class, draw the polarization of the neutral solid sphere. If there is no polarization, explain why this is so.

4. (*25 points*) A negative charge $-Q$ is uniformly distributed throughout a plastic sphere represented by the shaded area on the diagram. The sphere is surrounded by a solid, *neutral*, shell of plastic. Using the diagrammatic conventions discussed in the textbook and in class, draw the polarization of the neutral solid shell. If there is no polarization, explain why this is so.
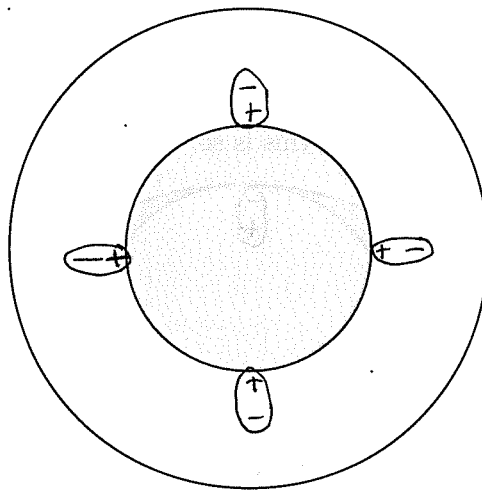
5. (*25 points*) Describe the pattern of electric field very far from the object of part (d).

Far away, the field resembles the field of a point charge with charge $-Q$.