HA 1.2 The field $\vec{E}$ of a uniformly charged shell at any point outside the shell. [50 points]

Consider a charge q uniformly distributed on the surface of a hollow sphere (shell) Σ of radius R.

1) Calculate $\vec{E}$ at any point outside Σ by means of Coulomb's law and the superposition principle of $\vec{E}$. [*Hint: There are several acceptable methods to solve this problem. For example, you can use the result for a loop of charge to construct the charged shell as an infinite set of loops of charge.*] [30 points]

2) Demonstrate that the so-obtained field is the same field generated by a point-like charge q located at the centre of Σ. [20 points]

Show calculations in full.