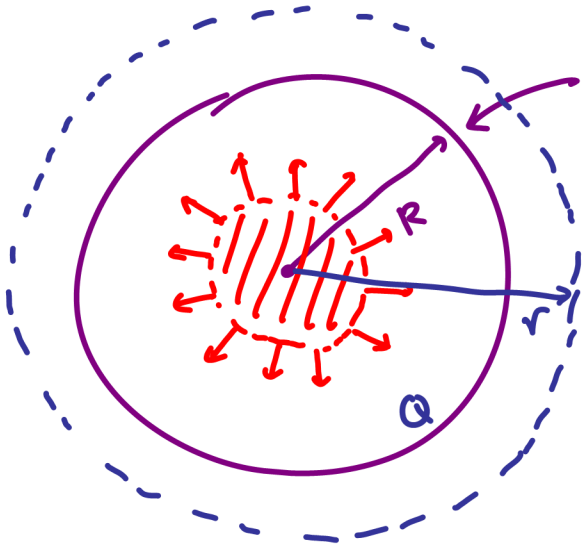

Sphere with uniform charge density ρ

total charge $Q = \rho V = \frac{4}{3}\pi R^3 \rho \rightarrow \rho = \frac{3Q}{4\pi R^3}$ } constant.

positive.

1. What is the electric field inside the sphere?
2. What is the electric field outside of the sphere?

1. Gaussian surface inside the sphere at radius $r < R$

$$\oint E \cdot dA = \frac{Q_{enc}}{\varepsilon_0}$$

$$E(A) = \frac{Q_{enc}}{\varepsilon_0}$$

$$\rho V = \left(\frac{3Q}{4\pi R^3}\right)\left(\frac{4}{3}\pi r^3\right) = \frac{Q}{R^3} r^3$$

$$E(4\pi r^2) = \frac{Q}{\varepsilon_0 R^3} r^3$$

$$\boxed{E = \frac{Q}{4\pi\varepsilon_0 R^3} r} \rightarrow E = \frac{kQ}{R^3} r$$

$E \propto r$

2. Gaussian surface outside of the sphere at radius $r > R$

$$\oint E \cdot dA = \frac{Q_{enc}}{\varepsilon_0}$$

$$E \cdot A = \frac{Q_{enc}}{\varepsilon_0}$$

$$E(4\pi r^2) = \frac{Q}{\varepsilon_0}$$

$$E = \frac{Q}{4\pi\varepsilon_0 r^2} \rightarrow \frac{kQ}{r^2}$$

looks a a point charge.