1) A charge of 6 microC is distributed uniformly thru a spherical volume having radius 5 cm. a) What is the E field at a radius of 2.5 cm? Explain your answer using Gauss's Law.

\[ E = \frac{kQ}{r^3} = \frac{(9 \times 10^9) \times (6 \times 10^{-6})}{(0.05)^3} = 1.08 \times 10^7 \text{ N/C} \]

\[ \oint \mathbf{E} \cdot d\mathbf{A} = \frac{Q}{\varepsilon_0} \Rightarrow E \cdot 4\pi r^2 = \frac{Q r^3}{\varepsilon_0} \Rightarrow E = \frac{1}{4\pi \varepsilon_0} \frac{Q r}{r^3} = \frac{kQ}{r^3} \]

According to the Gauss's Law, \( \mathbf{E} \) depends on the charge inside the Gaussian surface. Thus \( \mathbf{E} \) inside the solid sphere is proportional to the distance \( r \) from the center.

b) What is the E field at a radius of 6 cm?

\[ E = \frac{kQ}{r^2} = \frac{(9 \times 10^9) \times (6 \times 10^{-6})}{(0.06)^2} = 1.5 \times 10^7 \text{ N/C} \]