Group Problem

1) A 20-cm radius hollow, conducting sphere has a positive charge of 37 nC. Determine the electric field on the surface of the sphere.

\[ E(4\pi(0)^2) = \frac{37 \times 10^{-9} \text{C}}{8.85 \times 10^{-12}} \]
\[ E = 8320 \text{ N/C} \]

2) What is the electric field inside the sphere?

\[ E = 0 \text{ anywhere inside, because } \rho_{\text{in}} = 0 \]

3) What is the electric field a distance of 40 cm from the center of the sphere?

\[ E(4\pi(4)^2) = \frac{37 \times 10^{-9} \text{C}}{8.85 \times 10^{-12}} \]
\[ E = 2080 \text{ N/C} \]

4) Two infinitely large plates are arranged so that they are parallel, and separated by a distance d. If the plates are oppositely charged, approximately what is the electric field between the plates? What is the approximate electric field outside the plates?

\[ E_{\text{in}}(A) = \frac{q}{\epsilon_0} \]
\[ E_{\text{in}} = \frac{q}{\epsilon_0} \]
\[ E_{\text{out}}(A) = 0 \]
\[ E_{\text{out}} = 0 \]

5) Again, start with same configuration of two infinite plates, but this time, give each plate the same charge—both positive. Now, what is the electric field between the plates? Outside the plates?

\[ E_{\text{in}} = 0 \]
\[ E_{\text{out}} = \frac{q}{\epsilon_0} \]