Physics 7311 Professor Scalise
Homework Assignment #4

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11. Solve Jackson Chapter 1 - Problem 3.

    Using Dirac delta functions in the appropriate coordinates, express the following charge distributions as three-dimensional charge densities $\rho(\vec{r})$.

    (a) In spherical coordinates, a charge Q uniformly distributed over a spherical shell of radius R.

    (b) In cylindrical coordinates, a charge λ per unit length uniformly distributed over a cylindrical surface of radius b.

    (c) In cylindrical coordinates, a charge Q spread uniformly over a flat circular disk of negligible thickness and radius R.

    (d) The same as (c), but using spherical coordinates.

12. Solve Jackson Chapter 1 - Problem 4.

    Each of three charged spheres of radius a, one conducting, one having a uniform charge density within its volume, and one having a spherically symmetric charge density which varies radially as $r^n \quad (n > -3)$, has a total charge Q. Use Gauss's theorem to obtain the electric fields both inside and outside each sphere. Sketch the behavior of the fields as a function of radius for the first two spheres, and for the third with $n = -2, +2$.