Fundamentals of Electromagnetic Fields and Waves: I

Fall 2006, EE 30348, Electrical Engineering, University of Notre Dame

Diagnosis: Assignment 2

The following points highlight some difficulties students had in the second assignment. Some advice on how to attack problems is also given.

1. The concept of a delta function was not clear to many students. For a good overview of the properties of the delta function, you are advised to read up the online article at http://en.wikipedia.org/wiki/Dirac_delta_function. You can append it using your textbook for earlier classes. In the assigned problem 3(c), when you integrate the dirac delta function, the volume of integration contains the center ($\mathbf{r} = 0$), and therefore $\int_v \delta(\mathbf{r})dv = 1$. Therefore the total charge in the sphere is just Q_0. The delta function is just a convenient form for representing a point charge as a volume charge. $\delta(\mathbf{r})$ has the units of $1/m^3$, since the units of a delta function is 1/(unit of it's argument). Note that the argument is $\delta[\mathbf{r} - \mathbf{r_0}] = \delta[(x - x_0)(y - y_0)(z - z_0]$, and hence the $1/m^3$. Similarly, the 1-D Dirac delta function $\delta(x)$ has the unit of $1/m$.

2. Retain the algebraic variables while solving a problem till the last step before substituting their numerical variables. This is a chronic problem with many students, and you need to look out since it will cause many errors. Postpone substituting numerical values into variables till the very end!

3. Some of you are still turning in scratch papers with a lot of parts crossed out and answers that are not boxed. If your writing is not clear and legible, points are taken off. If you do not write down your logic in arriving at the solutions, the grader has no way of knowing whether you really solved the problem or wrote down the answer from the end of the book. Please keep this in mind.