Preparatory Assignments – Week 7

Due March 6

A voltage distribution is defined below for a sphercial coordinate system. Determine the Electric Field, E, and the charge density, ρ, everywhere.

$$V = \begin{cases} V_o[\dfrac{b^3}{3} - \dfrac{a^3}{3} + b^4(\dfrac{1}{b} - \dfrac{1}{c})] & r < a \\ V_o[\dfrac{b^3}{3} - \dfrac{r^3}{3} + b^4(\dfrac{1}{b} - \dfrac{1}{c})] & a < r < b \\ V_o b^4(\dfrac{1}{r} - \dfrac{1}{c}) & b < r < c \\ 0 & c < r \end{cases}$$

Due March 7

For the following charge distributions, write down the second order differential equation used to solve Laplace's equation.

1. $\rho \to \rho(x)$ *cartesian*
2. $\rho \to \rho(r)$ *cylindrical*
3. $\rho \to \rho(r)$ *spherical*