PHY 712 – Problem Set # 8

Continue reading Chapter 3 of **Jackson**.

1. Suppose that a charge distribution associated with an electron bound to an atom has the form:

$$\rho(\mathbf{r}) = -\frac{e}{24a^3} \frac{1}{\sqrt{4\pi}} \left(\frac{r}{a}\right)^2 e^{-r/a} \left(\sqrt{\frac{4}{5}} Y_{20}(\hat{\mathbf{r}}) + Y_{00}(\hat{\mathbf{r}})\right). \tag{1}$$

   (a) What is the total charge associated with this distribution?

   (b) What is the electrostatic potential associated with the distribution? Assume that the potential vanishes as $r \to \infty$.