

PHY505 - Classical Electrodynamics

Homework No. 5

Due: Monday, October 14, 2002

1. Jackson 2.4
2. Let  $\phi_S(\vec{x})$  be the arbitrarily given value of  $\phi$  on the surface of a sphere of radius  $R_0$ .

(a) Show that  $\phi(\vec{x}_p)$  at any point *inside* the sphere is given by

$$\phi(\vec{x}_p) = \frac{R_0^2 - R_p^2}{4\pi R_0} \oint dS \frac{\phi_S(\vec{x})}{r^3}$$

where  $R_p = |\vec{x}_p|$ , and  $r$  is the distance from  $\vec{x}_p$  to the integration point on the sphere.

(b) Find the corresponding solution of the problem for points *outside* of the sphere.

3. Jackson 1.21