Physics 8.322, Spring 2003

Homework #9 (short problem set)

Due **Wednesday, April 23** by 4:00 PM in the 8.322 homework box in 4-339B.

1. Show that

$$(\Delta^2 + k^2)G_{\pm}(\mathbf{x}, \mathbf{x}') = \delta^{(3)}(\mathbf{x} - \mathbf{x}')$$

where

$$G_{\pm}(\mathbf{x}, \mathbf{x}') = -\frac{1}{4\pi}\frac{e^{\pm ikr}}{r}$$

and $r = |\mathbf{x} - \mathbf{x}'|$

2. Sakurai: Problem 1, Chapter 7 (page 441)

3. Calculate the Born approximation for the scattering of an electron from a nucleus which is approximated by a uniformly charged sphere of radius R and charge Ze

(In this problem you may wish to use a Yukawa-type regulator $e^{-\mu r}$ as discussed on page 387 of Sakurai, taking the limit $\mu \to 0$ at the end of the calculation.)