Homework 3

Due Wednesday 2/10/2010 - at 5:00pm

Reading Assignment - Chapter 3 Except Section 3.4

Griffiths' Problems

3.8

3.9

3.12

3.18 Hint - Use trig identities the write the potential in terms of the Legendre polynomials.

3.22 Calculate only the first 4 terms up to P_3 explicitly.

Additional Problems

E.3.1 Finish the conducting channel I proposed in class. Find the potential inside a rectangular channel with $V(x, y, 0) = V_0$, $V(x, 0, z) = 0$, $V(x, a, z) = 0$, $V(0, y, z) = 0$, $V(a, y, z) = 0$. This channel has its long sides grounded and its end at V_0.

E.3.2 The potential at the surface of an infinite cylinder of radius a is $V(a, \phi, z) = V_0 \cos(3\phi)$. Find the potential both inside and outside the cylinder. Find the field inside and outside and the surface charge density on the cylinder.

E.3.3 Find the potential in the region where $x > 0$ and $y > 0$. The $y - z$ plane is held at potential V_0 and the $x - z$ plane is grounded. Hint, look at the trivial solutions.