Electrodynamics I: Assignment 3
Due no later than October 26 at 4:00 pm Pacific time.
On-line submission procedure:

1. **Scan your solutions as a single PDF file**
2. **Name your file HW2-*lastname.*pdf**
3. **Attach your file to an email…**
4. **… with subject line HW2-*lastname* …**
5. **… and send the email to ljrosenberg@phys.washington.edu**

1. Two short problems.
(a) Green's function solution with Neumann boundary condition. Show that the "simplest allowable boundary condition" (Jackson equation 1.45) indeed leads to the leading constant term in Jackson equation 1.46.
(b) A charge *q* is distributed throughout a finite volume, and that volume is completely contained within a sphere. Show that the average electrostatic potential over the sphere doesn't depend on how the charge is distributed over the finite volume

2. Consider a cubical surface centered on the origin, with each side of length *d*.
a. What's the (Dirichlet) Green's Function inside the cube?
b. Outside the surface, there's an electrostatic field with the character of that produced by a point charge *q* at the origin: Find the surface charge producing this apparent point-charge exterior field.

3. 2D electrostatics. Two infinite, parallel, grounded conducting planes are separated by a distance *d*. A line charge with linear charge density λ is located between the plates, is parallel to the planes, and is located a distance z_0 from one of the planes. using image charges, find the potential between the plates. The main issue here is to tabulate the image line-charges and their locations.

4. For the system in (3), instead use separation of variables to find the potential between the plates. You'll need to deal in some way with the line charge in the context of separation of variables and boundary conditions: The standard approach is to consider separate solutions on either "side" of the line charge, then match appropriate derivatives of the potentials at the "surface" plane containing the line charge.