Electrodynamics: Homework Assignment 3. Due October 18 either 11:00am in class or 10:45am in the instructor's mailbox.

1. Image charge.
a. Consider an infinite line charge with linear charge density λ. The line charge is parallel to and outside of a neutral conducting cylinder of radius R a distance d from the cylinder axis. Find the electrostatic potential of the cylinder.
b. Find the capacitance per unit length between two parallel cylinders, each of radius R, with axes separated by a distance $2d$.

2. Green's Function. Two infinite planes intersect at an angle α. What's the 2D Green's function for a line charge in the wedge region between the planes?

3. Orthogonality of solutions to Laplace's equation. Suppose you have two different eigenfunction solutions of Laplace's equation in spherical coordinates.
a. Show that the two solutions are orthogonal to each other under a certain condition.
b. What is that certain condition?

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