Electrodynamics I: Assignment 4.
Due October 24 at 11:00am in class or 10:45am in the instructor's mailbox.

1. 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? There's no need to re-derive everything. You can start from the appropriate solutions of the 2D Laplace's equation.

2. 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 located a distance z_0 above one of the planes. using image charges, find the potential between the plates. The point here is to tabulate the image charges and their location.

3. For the system in (2), 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: You might consider separate solutions on either "side" of the line charge, then match appropriate derivatives of the potentials at the "surface" containing the line charge.

4. Variant of Jackson problem 2.10. A large parallel-plate capacitor is made up of two plane conducting sheets with separation *D*, one of which has a small hemispherical boss of radius *a* on its inner surface (*D*>>*a*). The conductor with the boss is at zero potential, and the other conductor is at a potential such that far from the boss the electric field between the plates is E_0.
a. Find the surface-charge densities at an arbitrary point on the plane and on the boss.
b. Show the total charge on the boss has magnitude $3\pi\varepsilon_0 E_0 a^2$.

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