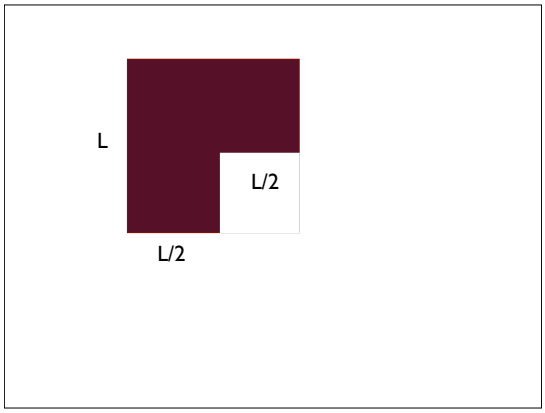
ELECTRODYNAMICS

PROBLEM SET 5

due March 2^{nd}, before class

Problem 1: Relaxation method

Implement the relaxation algorithm described in class to find the potential inside a region with the shape as in the figure. The top edge is kept at $\phi = V$ and the other borders at $\phi = 0$. Estimate the error in your answer. Can you achieve a 1% precision at the center of the upper left square? (you can use units where $V = 1$, $L = 1$).



Problem 2: Dipole layer

Two parallel infinite planes are charged with charge densities σ and $-\sigma$. Plot the potential along a direction perpendicular to the planes. WHat is the potential drop across both planes? *hint: this is as trivial as it looks*

Problem 3: Infinite cylinder Consider an cylinder with radius a and length L. The curved surface and the bottom $z = 0$ face of the cylinder are kept at potential $\phi = 0$. The top of the cylinder is $z = L$ is kept at $\phi = V$. Compute the potential inside the cylinder. Use the properties of these Bessel function you may need without proof.