# COMPUTATIONAL PHYSICS (PHY241)

## HOMEWORK ASSIGNMENT 4

Due Date: **Wednesday, February 23, 2022**

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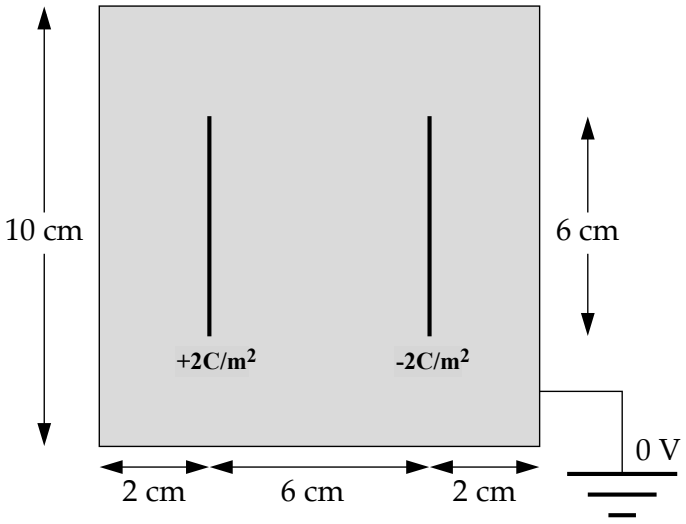
Consider the following simple model of an electronic capacitor, consisting of two flat metal plates enclosed in a square metal box:




For simplicity let us model the system in two dimensions. The walls of the box are at voltage zero and the two plates (which are of negligible thickness) have a charge density of $\pm 2\,\mathrm{C/m^2}$ as shown. Using any of the methods we have studied, write a program to calculate the potential distribution inside the box.

Your answer/solution must contain following parts:

1. (15 points) Describe the method you choose for this problem. Turn the Poisson's equation into finite-difference form.
2. (70 points) Write a program to calculate the electrostatic potential in the box on a grid of $100 \times 100$ points. Have your program calculate the value of the potential at each grid point to a precision of $10^{-6}$ volts.
3. (15 points) Make a density plot of the result and briefly discuss the result.