P10B

Laplace's Equation in 2 dimensions.

$$\nabla^2 V = 0$$
$$\frac{\partial^2 V}{\partial x^2} + \frac{\partial^2 V}{\partial y^2} = 0$$

Note that it is no longer true that $\frac{\partial^2 V}{\partial x^2} = 0$, just that $\frac{\partial^2 V}{\partial y^2}$ must equal $-\frac{\partial^2 V}{\partial y^2}$.

(a) Consider the case of a 2x2 m box where the left plate is held at 5V and the other three sides are held at 0V. Use the relaxation algorithm used for project 10A to determine the electric potential V everywhere in this box. Use 20 steps in each dimension.

(b) Create a surface plot in Excel of V(x,y).

(c) Add a feature to your program where a user enters a set of coordinates in the box and your program then prints the voltage at that point as well as the electric field at that point (in component form).

Submit your cpp and xls files. Due Friday April 26th.