GG250 Lab 7
Solving a Physical Problem with Loops

This lab will have you solve for the steady state temperature in plate heated at its edges. The temperature at the edges of the plate will be held fixed. You might find it helpful to review Lab2 since some of the commands from that lab are used here.

Exercise 7

Prepare a script that uses a finite difference method with a square grid to calculate and plot the temperature in a plate heated at its edges. Use doubly nested loops to do a heat flow problem. Let x and y vary from 0 to 50 by increments of 1. First set the initial temperature distribution to a random distribution with values between 0 and 10. Then revise the initial temperature distribution so that the initial temperatures (T_0) on the edges of the plate are as follows:

For all values of y, at x = 50, T_0 = 10
For all values of y, at x = 0, T_0 = 0
For all values of y, at y = 50, T_0 = 0
For all values of y, at 0 = 0, T_0 = 0
The values of T_0 in the corners won't matter – they can be either 0 or 10.
Leave the initial temperatures in the interior of plate alone!

Submit a code that shows the initial temperature distribution and the steady state ("final") temperature distribution using
a) A surfl plot
b) A contour map
This will mean your code should produce a total of 4 plots should have titles and the axes labeled.

As you develop and test the code you might want to produce plots at each iteration through the grid (like the examples in class), but for the final script, just have it print plots at the start and the end. Start with script (a) so that you don't have problems getting stuck in an infinite loop. Once the script seems to be running OK, they revise it along the lines of script (c). You might need to review the various Matlab commands in the scripts so you understand what they do.