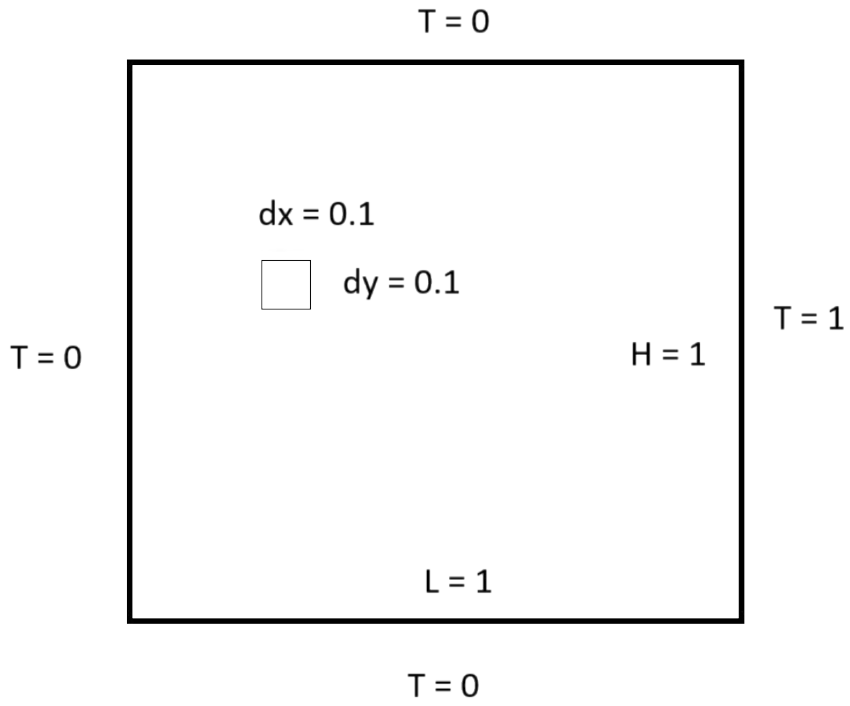
Tutorial 5 Total 10 marks

Question 1 (10 marks)

A 2D Square plate is heated to a temperature of 1 on one side, but kept cold (temperature = 0) on the 3 remaining sides:



Using a 2D Finite Difference Method (FDM) with dx = dy = 0.01 (i.e. 100x100 cells):

A) Write an equation for the final temperature in cell i,j (or T(i,j)) in terms of the temperatures of the cells around i,j. (where $1 < i, j < 10$)
B) Write a C code which creates a matrix A and a vector B where the final temperature x can be written as: Ax = B. Your code should save A and B to file. Save your code as Tutorial_5a.c .
C) Using your C code from Tutorial 4 (your CG solver) as a starting point, solve for the final temperature x. Your code should load the matrix A and vector B from file. Save your code as Tutorial_5b.c .
D) Plot contours of T and show me for your marks.

Tip: You should use dx = 0.1 (i.e 10x10) before you try 100x100.