Program Purpose:

The purpose of this project is to see how linear systems appears in simple applications. Since this will simulate a real life application, solving this problem by hand can be very time consuming, hence you will be required to submit a MATLAB code to solve the problem.

Consider a square plate of dimension *L* where the edges are held at constant temperature as indicated below. In applications, one can estimate the temperature at various locations of the plate by using thermocouples at various grid locations. However, drilling so many holes can be expensive. Using linear algebra **we can estimate the temperature of each point in a grid by assuming it is the average temperature of the four points surrounding it**.

Program Steps:

Christina:

- Set up linear system for 3x3 grid by hand to solve Ax=b
- Analyzed 3x3 grid solution to find a general method for the 5x5 and nxn matrices
- Used this general method to set up the system for the 5x5 grid in Matlab, solved the system, and visualized the solution. The visualization shown by imagesc(x) was in reverse, so I flipped the components of the solution vector b and the visualization was correct.
- Worked with the peer tutor and Dr. Nguyen to find the code for a nxn matrix.

Dany:

- Set up a linear system for the 3x3 grid by hand → Found the A matrix and b matrix then solved and visualized it with matlab using x = A\b and spy(A) + imagesc(x)
- Analyzed the 3x3 grid solution to find a pattern that would apply to both the 5x5 grid and the nxn grid.
- Partially wrote the code for the A matrix of the nxn grid with the help of our peer tutor, Abraham.
- Wrote the code for the right-hand side, vector b, and solved and visualized using x = A\b and spy(A) + imagesc(x)

Program Final Output: