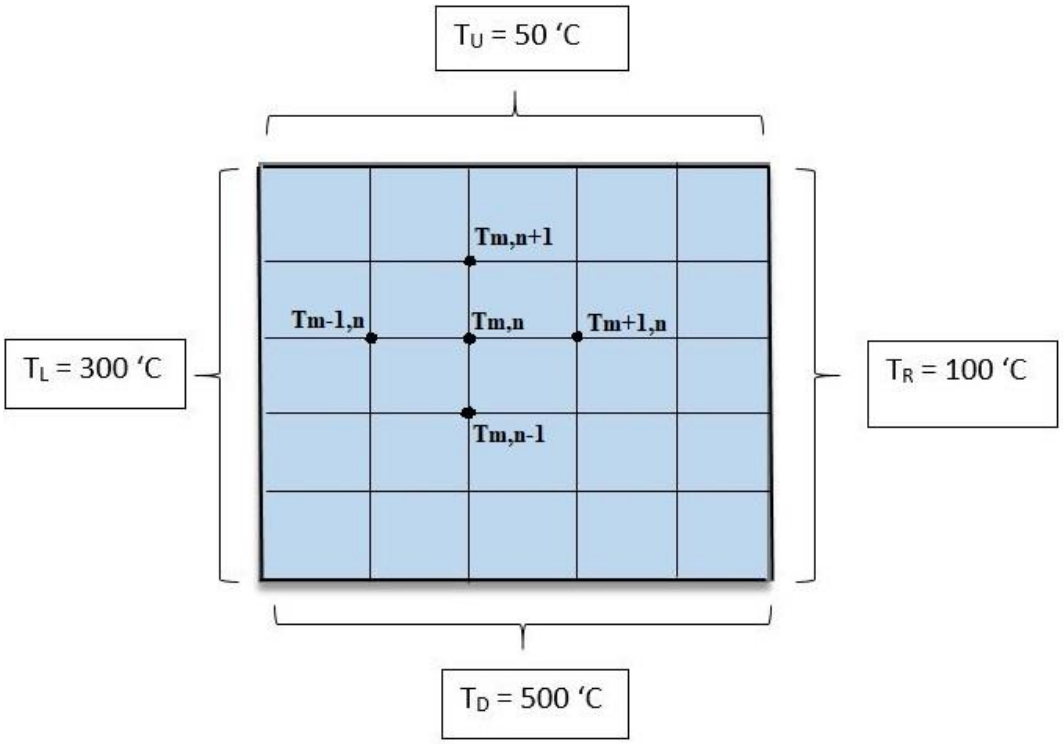
A very thin plate with surface size 1×1m is held at constant temperature from four sides. The two dimensional equation is presented below.

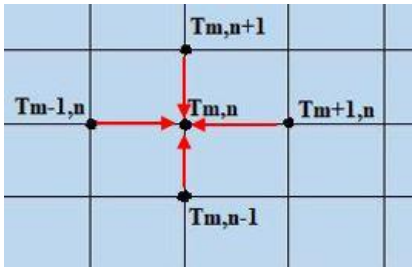
$$\frac{\partial^2 T}{\partial x^2} + \frac{\partial^2 T}{\partial y^2} = 0$$

Figure below illustrates boundary conditions for this equation.



n is number of divisions in y direction and m is number of divisions in x direction. for m=n numerical solution for this equation is presented as:

$$-4\,T_{m,n} + T_{m+1,n} + T_{m-1,n} + T_{m,n+1} + T_{m,n-1} = 0$$



$$m = \frac{x\ length}{\Delta x}, \qquad n = \frac{y\ length}{\Delta y}, \qquad m = n \quad and \quad xlength = ylength \quad so \quad \Delta x = \Delta y$$

1. Find the numerical solution for steady state heat transfer of the plate

2. Use matlab “contour” and “surf” to plot the temperature profile

3. Define the boundary conditions and number of divisions in x and y direction as user inputs in matlab