**LECTURE ASSIGNMENT 1**

A rectangular membrane of side length , density , thickness , and tightening  (force per unit length) is loaded by its own weight as shown. If the edges are fixed, find the transverse displacements at the grid points  of a regular grid using the Finite Difference Method. Use symmetry to reduce the number of non-zero independent displacements to one.

*x*

 *L*

*y*

*L*

*g*

Name**\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_** Student number**\_\_\_\_\_\_\_\_\_\_\_\_\_**

In a stationary problem, the discrete equations given by the Finite Difference Method on regular grid of spacing  are

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In the present problem, the set of interior points is given by



the remaining of  being boundary points of vanishing displacements. Due to symmetry, displacements at the interior points should be equal. Denoting the value by , all equations for the interior point  boil down to



 giving as the displacement at the interior points

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