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**Laplacian Approximation**

The following are equi-potential lines (contours) for varying discretization parameters and number of random walks for the given boundary value problem. As the discretization parameter increases so too greatly does the resolution of the contour. Increasing the number of random walks seems to yield more reasonable results. Choosing greater than 2000 walks seemed to make little difference in the Frobenius Norm of succeeding approximation solution maps (matrices) as is visible in the contour plots below.

Near the corners by the non-zero boundary the solution seems to be the average of that boundary and those adjacent. The Matlab code that accomplishes the Laplacian approximation is well commented and easy to follow. It essentially creates a matrix of the discretized space and randomly walks from cell to cell in that matrix until it reaches a boundary, taking note of every point it visited on the way (via adjacency matrix to increase performance) and awarding the value to the sum of each point's *boundary rewards* .









