PGM Assignment 4: Programming Problem

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The area of a circle with radius r is πr^2 and the area of a square bounding the circle is $4r^2$. So the ratio of the two areas is $x = \pi/4$. Hence the value of π is given by $4x$. Since the ratio of points constituting the circle and square is identical even if considering only a quadrant, we can restrict our sampling to that. By randomly generating points inside a unit square, the code analyzes how many points fall within the quadrant by calculating the sum of the squares of the x and y coordinates and comparing that to the square of the circle radius which is 1. The ratio of this number to the total number of generated points gives us the value of x and an approximate value of π is obtained as $4x$.

The MATLAB code is attached with this report. The exercise was undertaken for a progressively larger number of generated points; the results were as follows:

N	1×10^2	1×10^3	1×10^4
π (est.)	3.2400	3.0960	3.1168

Plots showing the generated points and their distribution are shown below.