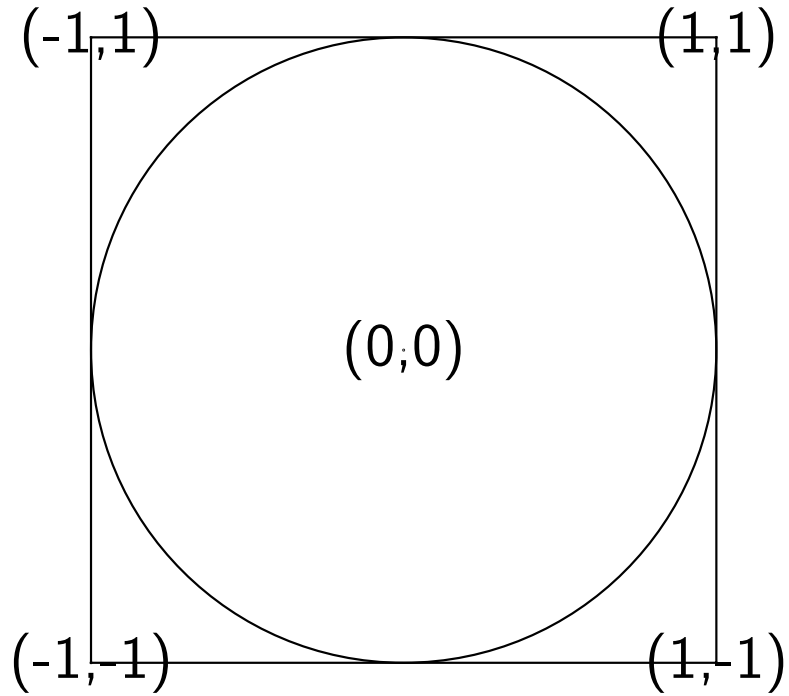
Assignments D

Assignment D (C/C++)

- Due: June 24 by 6 PM.
- A simple Monte Carlo simulation can be used to approximate the value of π.
- The figure below shows a circle with radius $r = 1$ inscribed within a square.



- The area of the circle is $\pi r^2 = \pi$, and the area of the square is $(2r)^2 = 4$. The ratio of the area of the circle to the area of the square, ρ, is given by:
  $\rho = \frac{AreaofCircle}{AreaofSquare} = \frac{\pi r^2}{(2r)^2} = \frac{\pi}{4}$

- Calculating the value of π using Monte Carlo involves the following steps:
  1. Assume the circle is centered at coordinates (0, 0).
  2. Generate N random points with coordinates (x, y) where x and y are independently drawn from a **uniform distribution** over the interval [-1, 1].
  3. Determine if each point lies inside the circle or not.
- The value of π can be estimated using the simulation results as follows.
  $\rho = \frac{M}{N} = \frac{\pi}{4}$
  where, N = total number of points generated and M = number of random points inside the circle.
- Write a program to calculate the value of π using information above, for N = 100, 1000 and 10000. Write the results to the standard output.
- Vectorizing/parallelizing code is NOT required for this assignment.