Homework 2 (threads)

Due by: 03/08/22

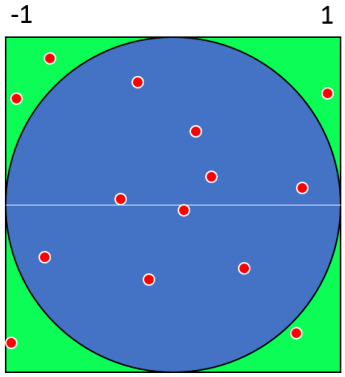
Part a.

Perform matrix multiplication using threads:

- m = 3000 (#rows = #cols)
- Data type = double precision (64 bits)
- # threads = {1, 2, 4, 8, 16, 32, 64, 128, 256, 512}
- Assume *Ts* = Time with one thread, and measure speedup

Part b.

Compute π by "randomly" choosing points. π is four times the fraction that falls in the circle (imagine you're throwing darts to a target).



$Ac = \pi r^2$

$As = 2r*2r = 4r^2$

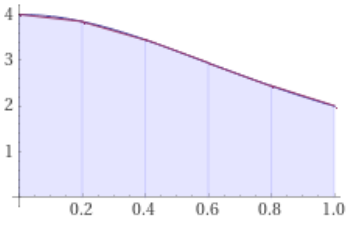
$P = Ac/As = \pi/4$

- You should use a thread-safe real uniform random generator
- Make a table for different values of *n* (# darts) and # threads

Part c.

Approximate the integral (area under the curve),

$$\int_0^1 \frac{4.0}{1+x^2} dx = \pi$$



using the *trapezoidal rule*. *n = 5*

- Your results must show convergence (more trapezoids, better approximation)
- Measure the speedup, you should attain at least quasilinear speedup

NOTE: You must create a folder "hw2" and place your source code AND report (PDF) in that folder. Your code MUST be well-documented, it should not produce ANY compilation nor linking error/warning (compile with -Wall). Also, it MUST efficiently use dynamic memory allocation (no leaks). The student is responsible of "killing" his/her job in case it takes an unreasonable amount of time (> 30min). "Zombie" jobs will be penalized. It is also responsibility of the students to report if there is a job running for a long time so it can be deleted by the instructor. **Use dgx.sdsu.edu** (You already got your username and password).