ECE498 MATLAB

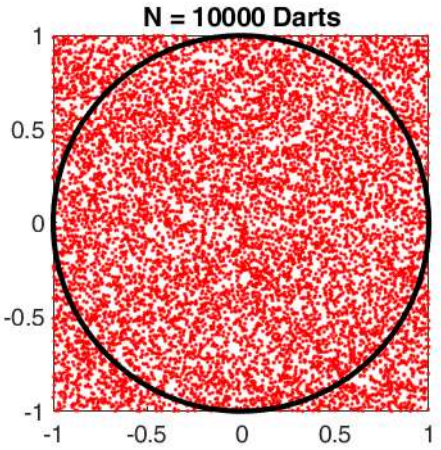
Throwing darts and approximating π.

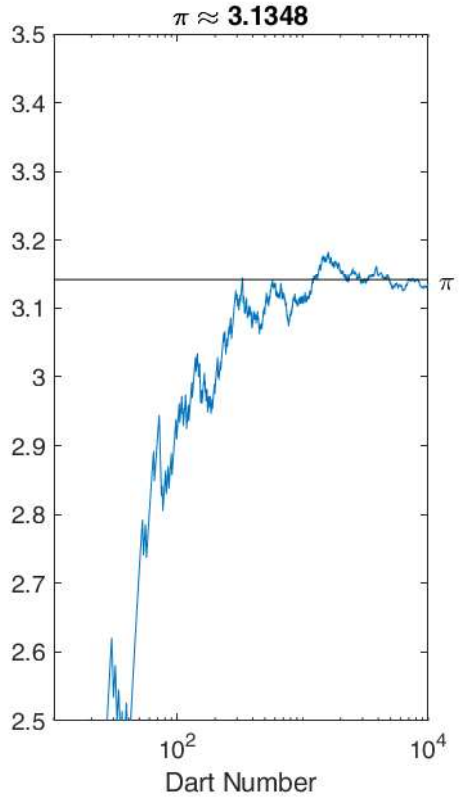
Consider a square dartboard with each side having length 2. Centered inside the square let there be a circle having radius 1.

If I throw N darts uniformly, but randomly distributed over the square, the ratio of those that land inside the circle to the total number N will be $\pi/4$. So if I multiply this ratio by 4, I get an approximation to the value of π.

The next page shows the results of my MATLAB solution. On the left are the square, the circle, and the $N = 10^4$ darts uniformly distributed over the board. On the right shows the approximation of π as N increases from 1 to 10^4.

1. Show why the ratio is $\pi/4$
2. Write MATLAB code as a script file dartboardpiXX.m where XX is your initials that duplicates my results.
3. The goal as always is to do this with no loops.


N = 10000 Darts
1
0.5
0
-0.5
-1
-1
-0.5
0
0.5
1


π ≈ 3.1348
3.5
3.4
3.3
3.2
3.1
3
2.9
2.8
2.7
2.6
2.5
π
10^2
10^4
Dart Number