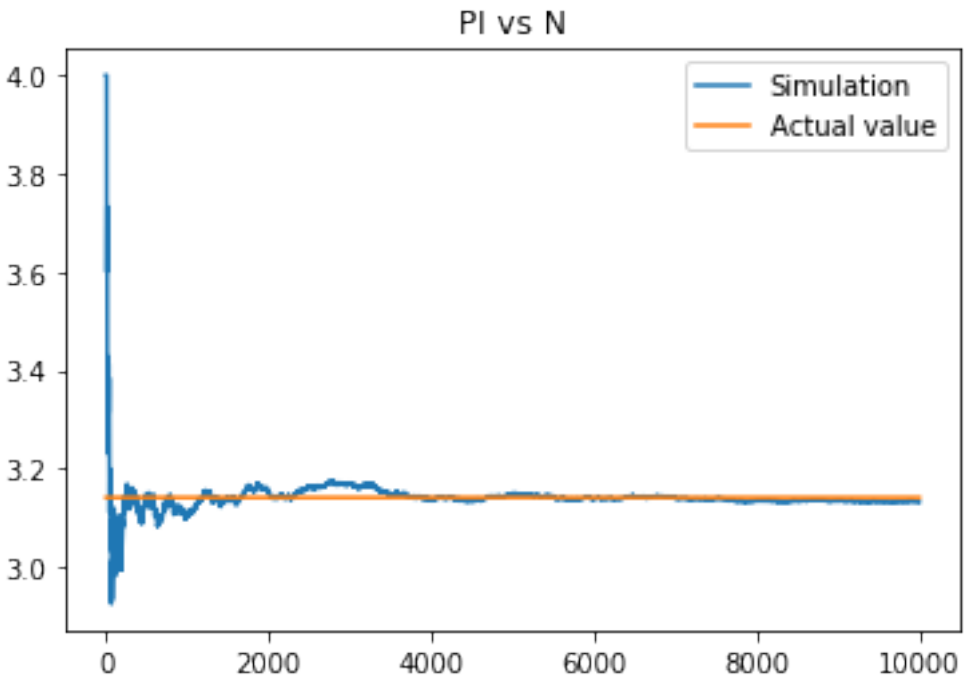
Q2

April 26, 2021

0.1 Finding the value of pi given n pebbles

Using **Monte Carlo** Simulations: Consider a square of side length 2 containing a unit circle within it. Throw pebbles into the square and count the number of pebbles in the circle. Given the area of square is s*s = 4, N be the total pebbles, n be the pebbles in the circle. Calculate pi by using the probability:*
n/N = area_of_circle/area_of_square = pi x r^2/4
Therefore, pi = 4 (n/N)

[1]:
```
import numpy as np
import matplotlib.pyplot as plt
import random
n = 10000
cnt = np.array(range(n))
inpt = 0
ttl = 0
pi = []
an = [np.pi for i in cnt]
for i in cnt:
    x = random.uniform(-1, 1)
    y = random.uniform(-1, 1)
    origin_dist= x**2 + y**2
    if origin_dist<= 1:
        inpt+= 1
    ttl+= 1
    pi.append((4*inpt)/ttl)
plt.plot(cnt,pi,label="Simulation")
plt.plot(cnt,an,label="Actual value")
plt.title("PI vs N")
plt.legend(loc="best")
plt.show()
```


PI vs N
Simulation
Actual value
4.0
3.8
3.6
3.4
3.2
3.0
0
2000
4000
6000
8000
10000