

Physics 325 — Scientific Computing — Fall 2016 — Lab 10

October 28, 2016

Exercise 2. Random Walk

Repeat Exercise 2 from last week, but make them self-avoiding walks. As a reminder here is last week's exercise 2 -

Either by writing new code, or by updating the code given in class, write a 2D random walk program that uses the better approach described in class to calculate steps. Use a step size of 1.0 As a reminder, the idea is to randomly choose an orientation angle that ranges from $0 < \theta < 2\pi$ and then changes the x and y positions in a step according to -

$$\Delta x = \cos(\theta)$$

$$\Delta y = \sin(\theta)$$

Plot for at least 10 walkers, and make a second plot that calculates and plots a histogram of the rms distance traveled for 100 walkers for $nsteps=100$. Comment on whether or not the histogram is peaked near the expected average rms distance traveled.

(10 points)

Exercise 2. Calculate π

Use random numbers as discussed in class to calculate the value of π . Make a plot of the estimate of π vs N where N is the number of paired random numbers chosen. Have your plot run from $N=1$ to 1000. **(10 points)**