

# Discussion

February 3, 2021

## 1 Random walks

In this problem we demonstrate random walks on a 2-D plane for 500 different random walks with variable step sizes. Here we calculate the average radial displacement for the walk for different step sizes and observe that as we increase the step sizes, radial displacement and rms displacement also increases with increasing steps. As for plot of  $R_{rms}$  vs  $N \cdot 0.5$  we observe that slope comes out to be  $\approx 1$  which indicates that

$$R_{rms} \approx \sqrt{N} \quad [1.1]$$

By observing mean displacement values for x,y we also see that probability of going in either direction is equally probable.

## 2 Monte Carlo

In this problem we try to find the volume of an ellipsoid with the help of monte carlo method. We take 50000 random points in a cuboid of given dimensions and count the number of points falling in the ellipsoidal region and then multiply the ratio of the two numbers by the volume of the cuboid to get the value of the volume of ellipsoid. From the graph of volume vs N we observe that as N gets larger we approach the analytical value of the volume and also fractional error also approaches to zero as N gets larger.