

DISCUSSION ON COMPUTATIONAL PHYSICS

ASSIGNMENT-08

- **SIMPLE RANDOM WALK IN 2 DIMENSION:**

Simple random walks are simulated using random number generators predefined in python library. The step sizes increase from 250 by a factor of 250. As the step size increases, the RMS value of the distance from the origin increases but the mean radial distance from the origin does not increase. In fact the average value of x and y is always found to be in a definite interval about the origin. This is because the 2-D random walk is a recurring process. This statement wont be true for 3-D random walks. We then plotted RMS distance vs the square root of N and obtained a linear relation in between them. This is because for a large enough N the RMS resembles the function \sqrt{N} .

- **MONTÉ CARLO METHOD TO FIND THE VOLUME:**

Even though Monte-Carlo method is inefficient to find the integral compared to other methods, it is very useful in finding the integrals of higher dimensional objects. The random number generator is used again to choose random points inside a boundary which encloses the curve. As the number of points increase the efficiency of the Monte-Carlo method increases. The fractional error is plotted against the increasing number of points and it is found that it decreases.. The volume of the integral also approaches the analytical value of the integral for large N which is as observed in the plot. The scatter plot of the set of random points which satisfy the constraint equation is visualized by plotting a 3-D scatter plot of the points which is observed to resemble an ellipsoid.