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Question 1

I selected the number of steps (N) for different sets to be 250, 500, 750,1000 and 1250. And performed 100 random walks for each starting from the origin in a two-dimensional space. Out of these 100 random walks, we plotted 5 walks for each step number sets of steps. Then I calculated the Radial distance average, root means square Radial distance, X-axis average and Y-axis average by taking the average over 100 walks for each set. In a theoretical point of view, X means and Y mean should be zero and they come to be very close to zero.
The graph of sqrt($<R^2>$) vs sqrt(N) it comes out to be almost a straight line. And since sqrt($<R^2>$) is something like the average positive distance away from 0 after N steps (technically, it's called the "root-mean-squared" distance), we expect that after N steps, the man will be roughly sqrt(N) steps away from where it started. So for N steps, we expect the man to have moved roughly sqrt(N) total spaces from 0 in either direction. Of course, sometimes it will move more and sometimes fewer total spaces, but sqrt(N) is roughly what we might expect. So I concluded that sqrt($<R^2>$)=sqrt(N), for a maximum number of cases.

Question 2

I started with 100 random points and go on increasing it by 100 points up to 50000, and calculated the volume using the Monte Carlo method. Then I plotted the calculated volume vs no. of random point and observed that with increasing the no. of points dropped the calculated volume approaches the actual analytical volume. This conclusion can be easily seen in the graph of fractional error vs no. of the random point. Then I plotted a 3-D plot of ellipsoid for 10000 points. The point which falls in the ellipsoid (let say n) divided by total point, is an equal ratio to of volume of ellipsoid and cuboid inclosing the ellipsoid.