

# Lab 10

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## Q1 Part a

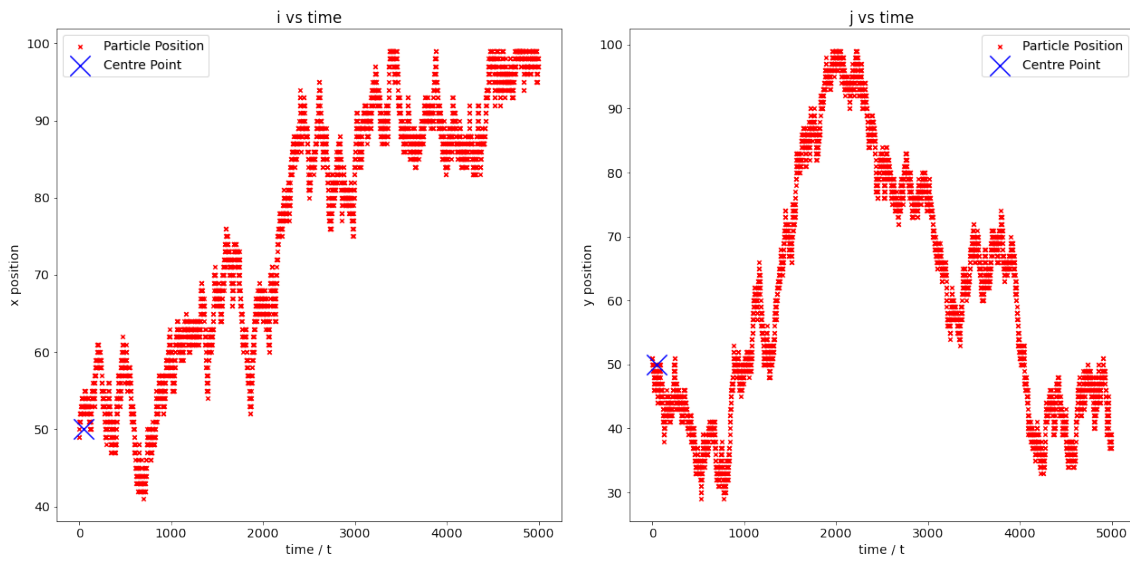


Figure 1:

Figure 2:

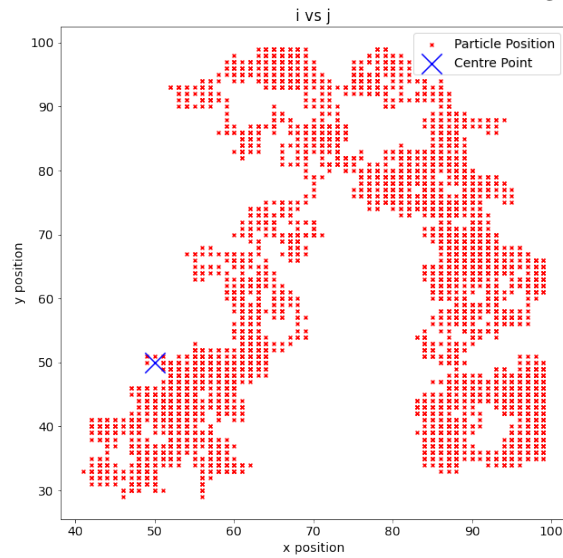


Figure 3:

## Q1 Part b

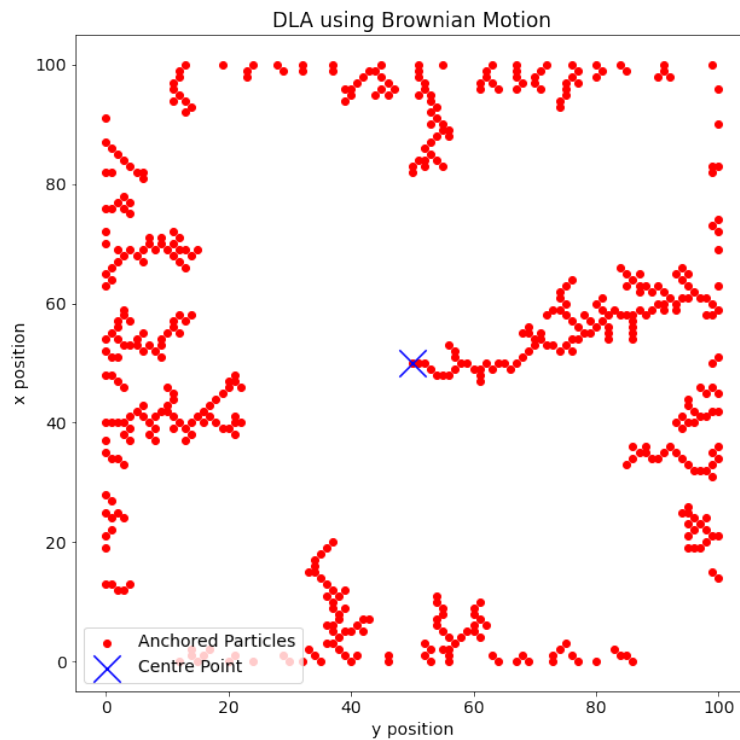


Figure 4:

## Q2

The estimation of the volume was performed a total of 10 times. The average of of these calculations came to be  $V_{avg} = 2.5464832$

## Q3 Part c

By looking at the 2 histograms below, we can see that the true value is roughly between 0.83-0.84. We can conclude that the importance sampling method is much better than the mean value method because the values are not as spread out as they are when we used the mean value method. Figure 1 shows how the values range from 0.81-0.88, while in figure 2 they only range from 0.83-0.85. This means that the importance sampling method has a much lower standard deviation than the mean value method. Therefore, we can say that importance sampling yields higher accuracy than the mean value method.

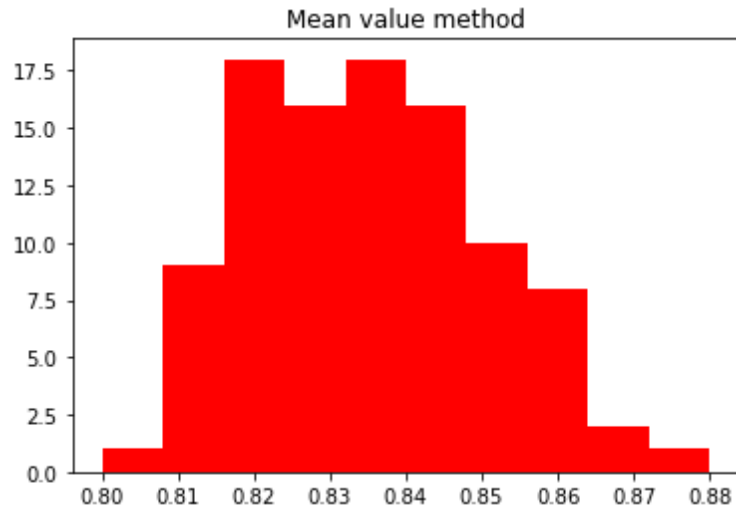


Figure 5: We used 10,000 sample points and used the mean value method to evaluate the integral  $\frac{x^{-1/2}}{1+e^x}$ . We did this calculation 100 times and plotted the values in the histogram above.

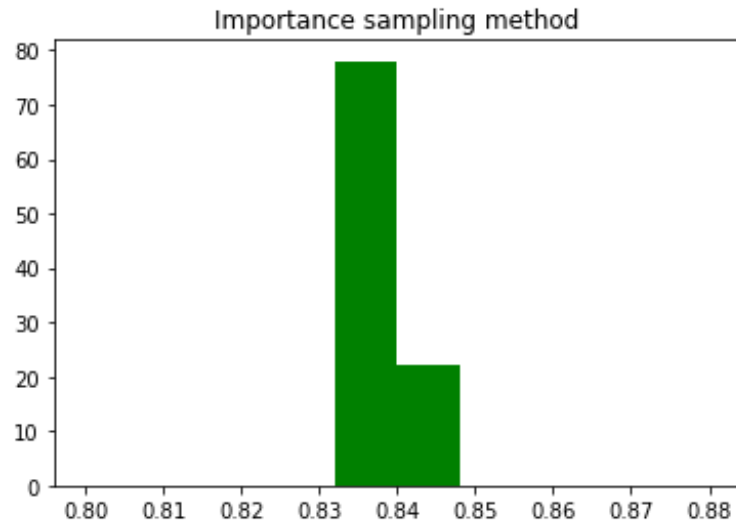


Figure 6: Here we used the importance sampling method to evaluate the same integral. This histogram shows the values we calculated, note that we repeated the calculation 100 times