Computational Physics Lab 10

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Q1

The green box shows the boundary of the box so its easier to see that its not passing the boundary.

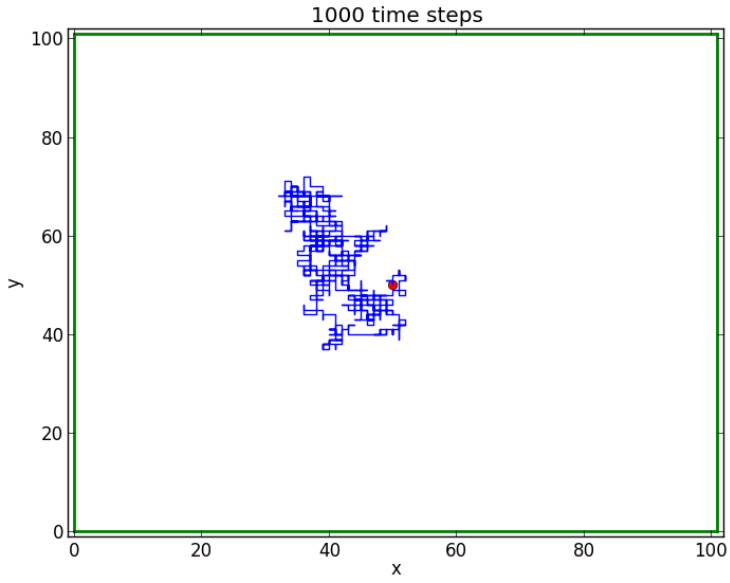

Figure 1:

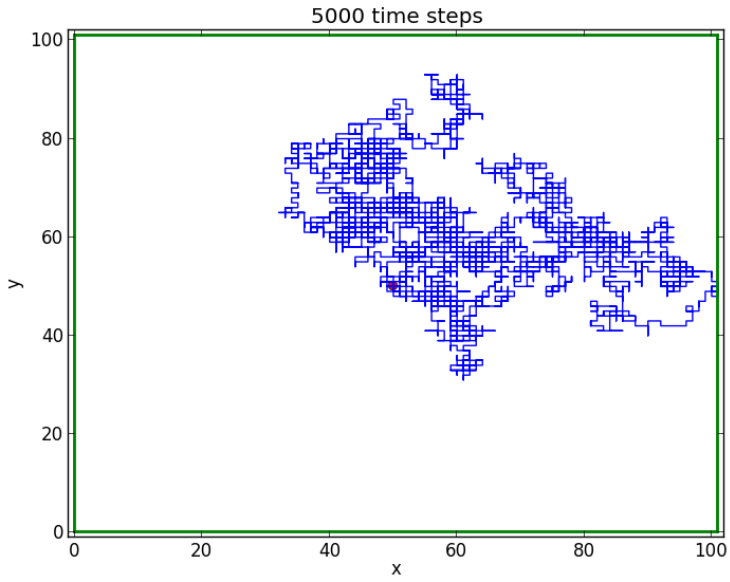

Figure 2:

Q3

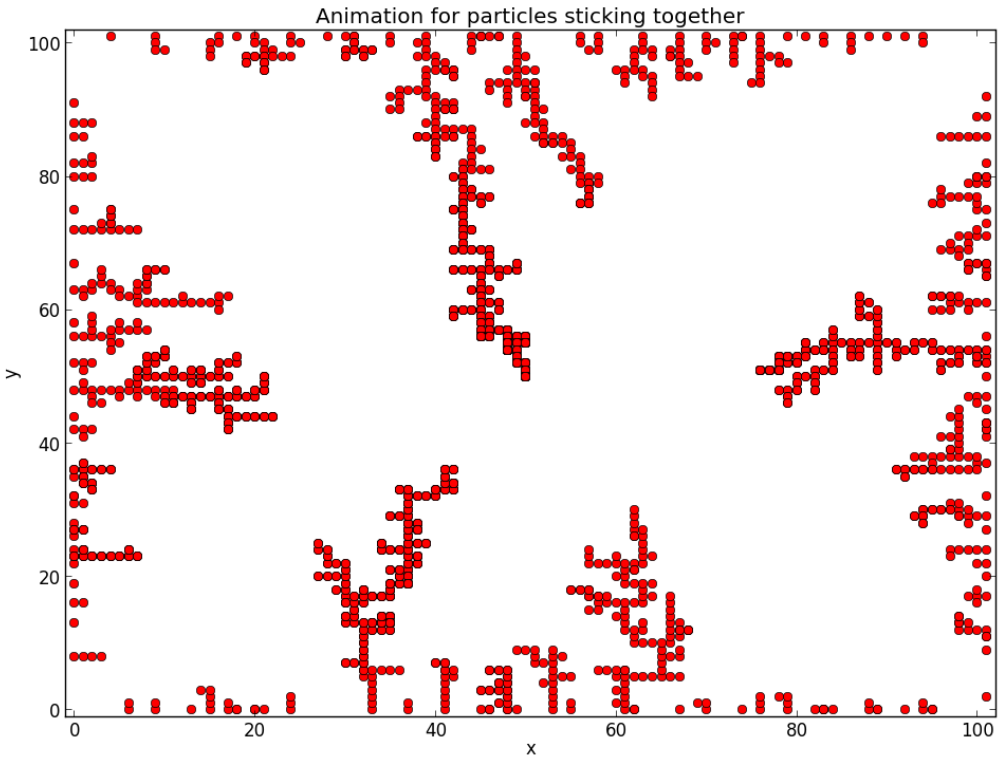

Figure 3: This figure shows the position of particles attached to each other.

Q4

The integral value is 2.6112 ± 0.0001 . The way I calculated is using equation in textbook:

$$\sigma = (b-a)\frac{\sqrt{v}arf}{\sqrt{N}} \tag{1}$$

where var f is defined as:

$$varf = \left\langle f^2 \right\rangle - \left\langle f \right\rangle^2 \tag{2}$$

where

$$\left\langle f \right\rangle = \frac{1}{N}\sum_{i=1}^{N}(f(x_i)) \tag{3}$$

$$\left\langle f^2 \right\rangle = \frac{1}{N} \sum_{i=1}^{N} (f(x_i))^2 \tag{4}$$

Q6

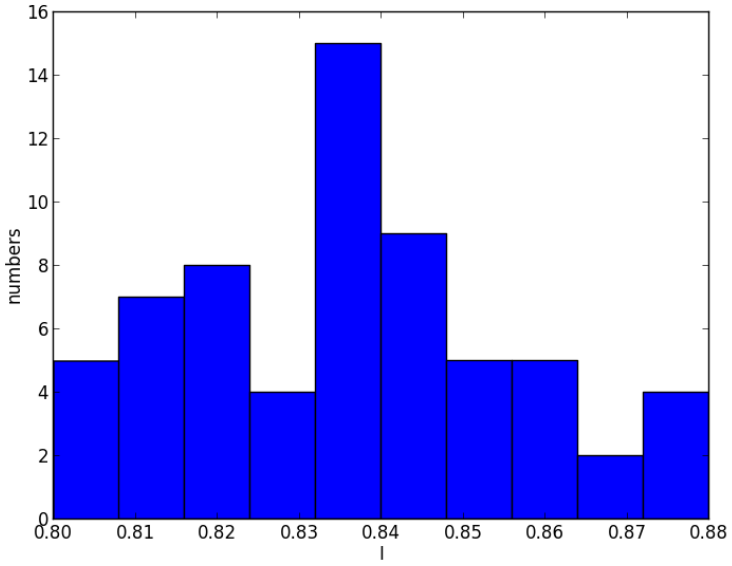

Figure 4:

Q7

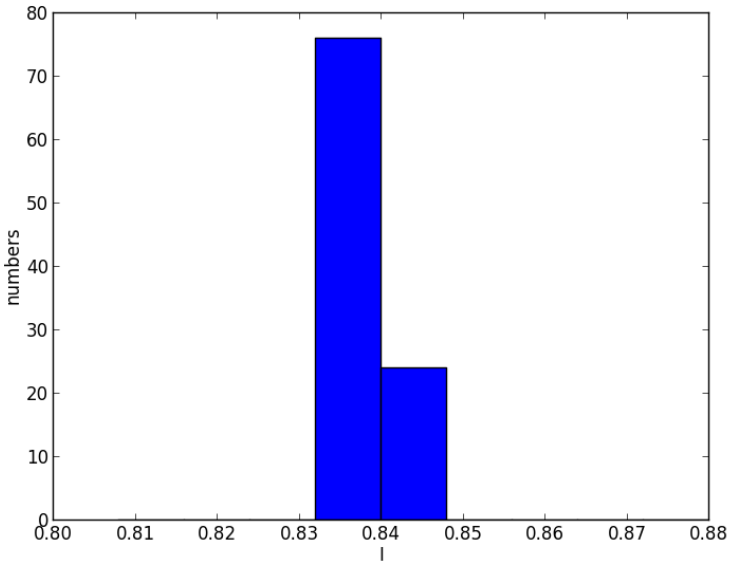

Figure 5:

As the histogram shows the method done in this question is much better than the method done in question 5 and 6, since the histogram has less spread in question 7, which means the value obtained is better.

In this question, I used the value of 2 for the $\int w$ by calculating it by hand. I also put the part in my code that calculates the integral of w using gaussian quadrature method and the value I got is 1.999 which is pretty close to the actual value, but using this value will introduce some error to the calculation of the integral.