

Integration using Monte Carlo

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Method Applied :-

- Consider the integral, $\int f(x) dx$
- Choose N points x_i at random with uniform probability within the integration interval $[0,1]$.
- Determine the mean value of f_i 's.
- Used `numpy` module to calculate mean & variance

How to execute?

```
Run : `python3 code.py`
```

Requirements:

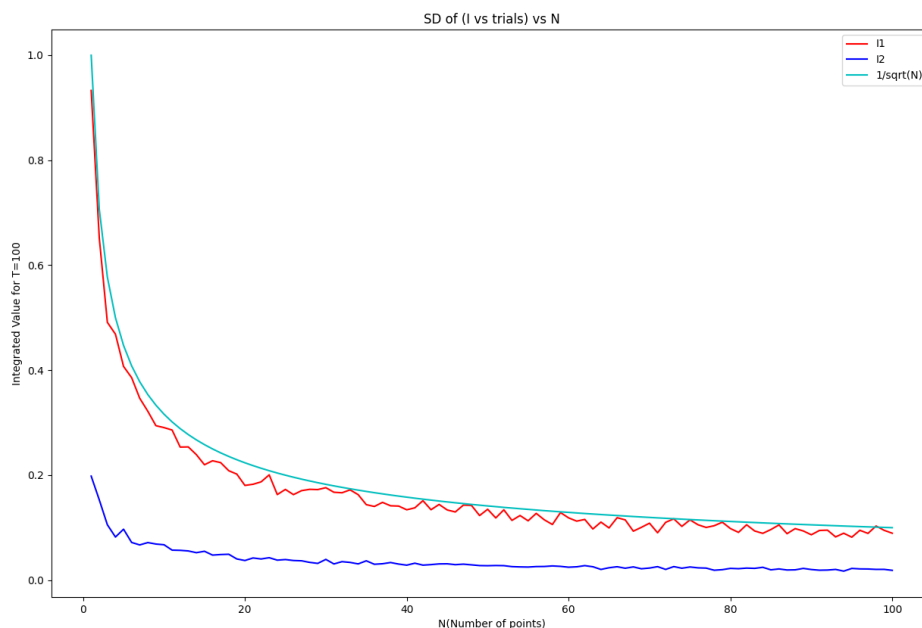
- matplotlib
- numpy

Observation

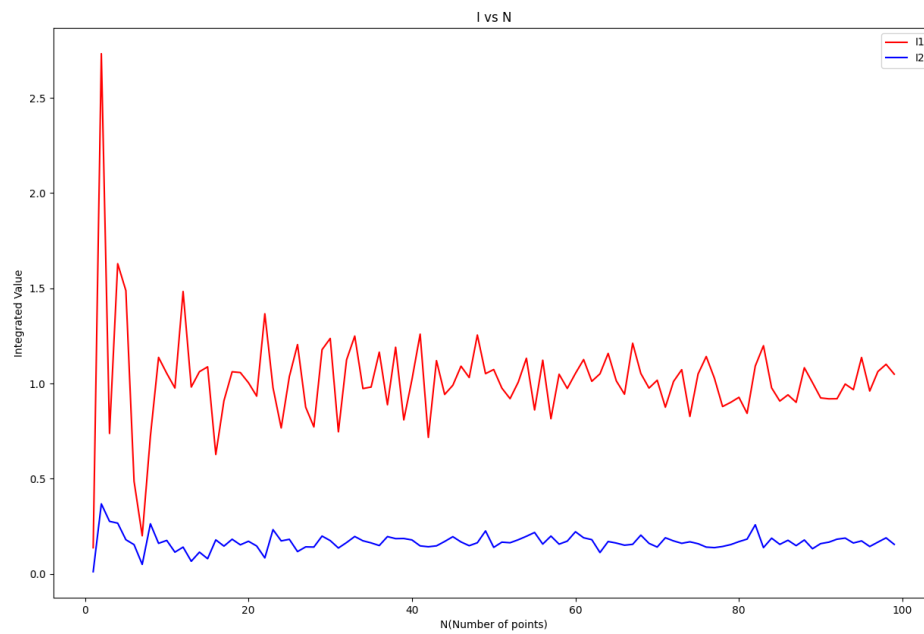
$$I1 = \int 3x^2 dx$$

$$I2 = \int \int x^2 y dx dy$$

We found STD in plot standard deviation (Of I vs trials) vs N to be proportional to $1/\sqrt{N}$ & inversely proportional to \sqrt{N} .



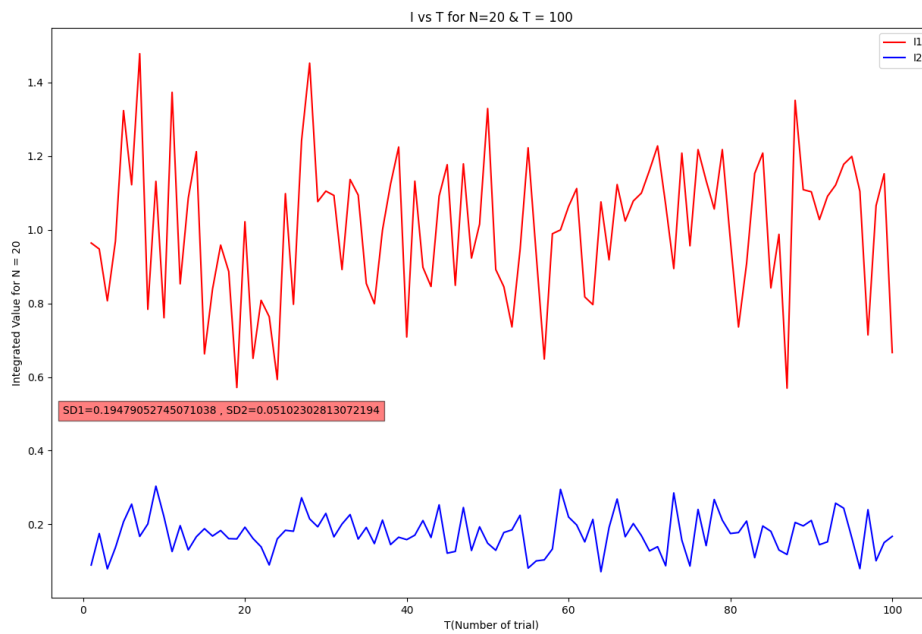
I vs N :



N=20; 100 trials; Plot I vs trial :

standard deviation for I1 = 0.21055162686245885

standard deviation for I2 = 0.04524763453840625



N=1000; 100 trials; Plot I vs trial :

standard deviation for I1 = 0.028508889767466874

standard deviation for I2 = 0.005891726284787438

