Integration 1

I1 vs Trials for N=20

I1 vs Trials for N=1000
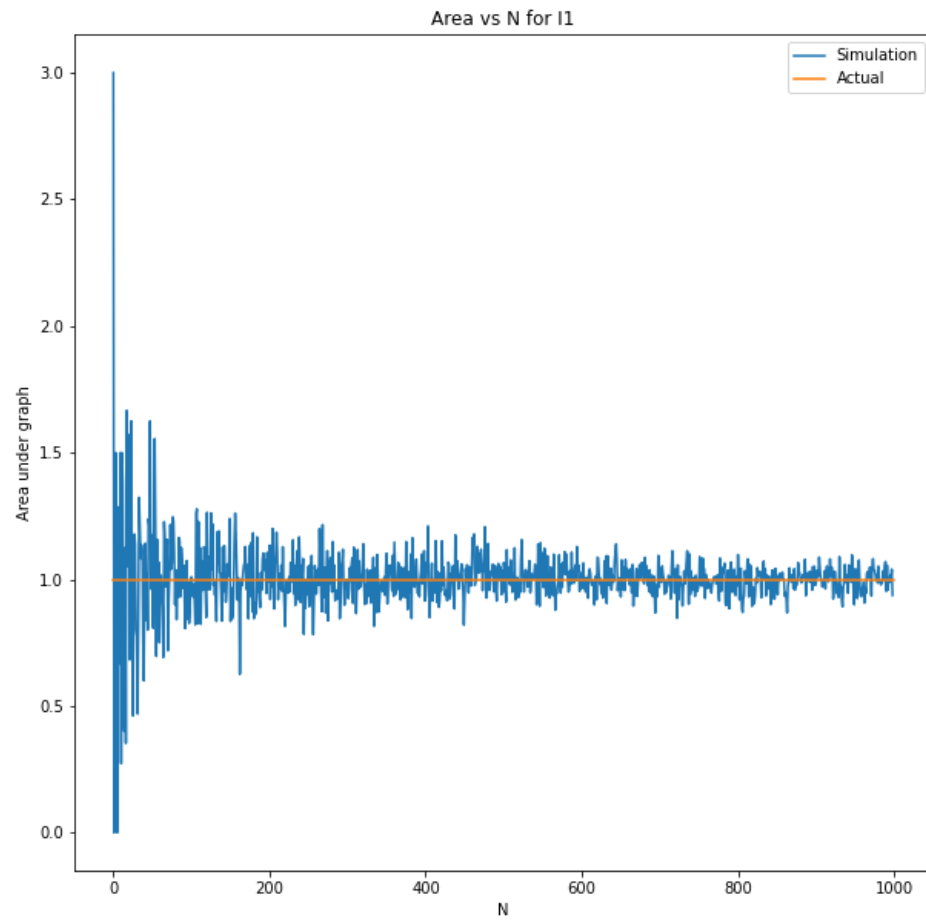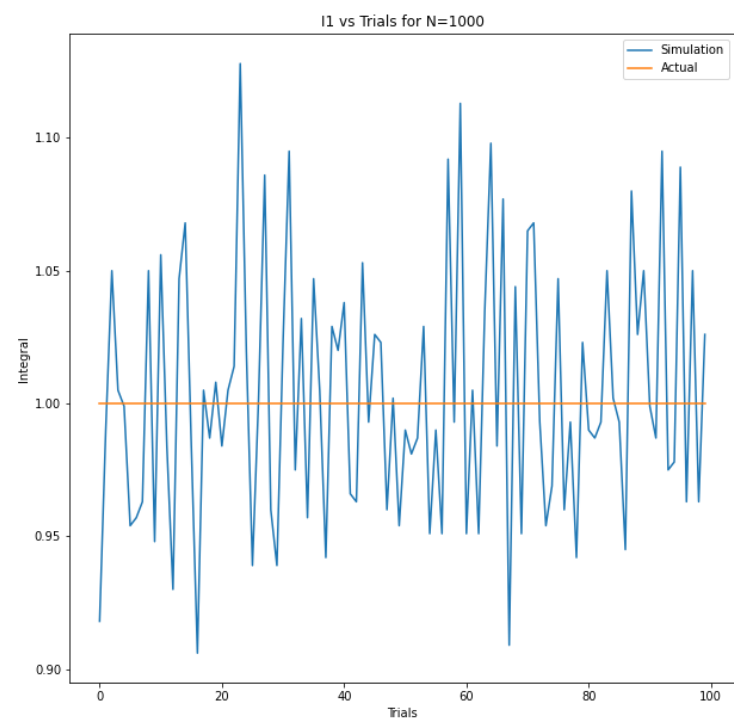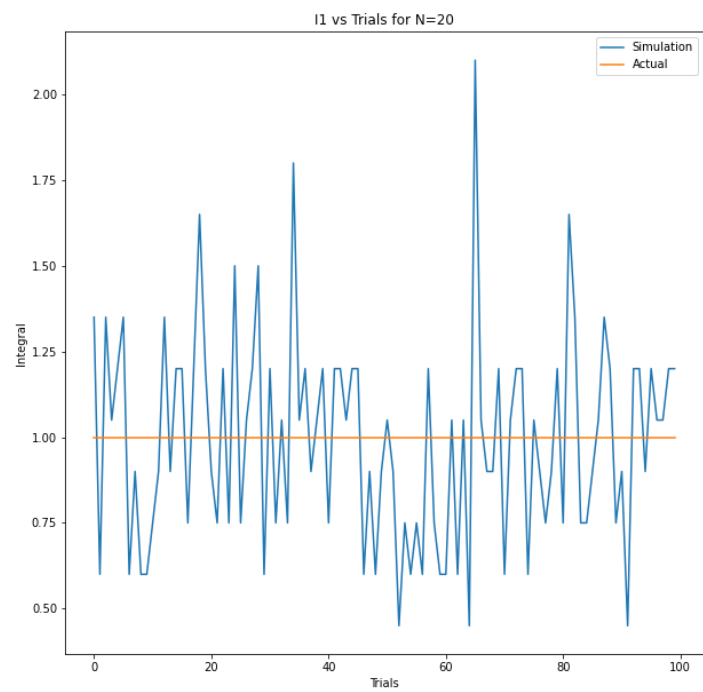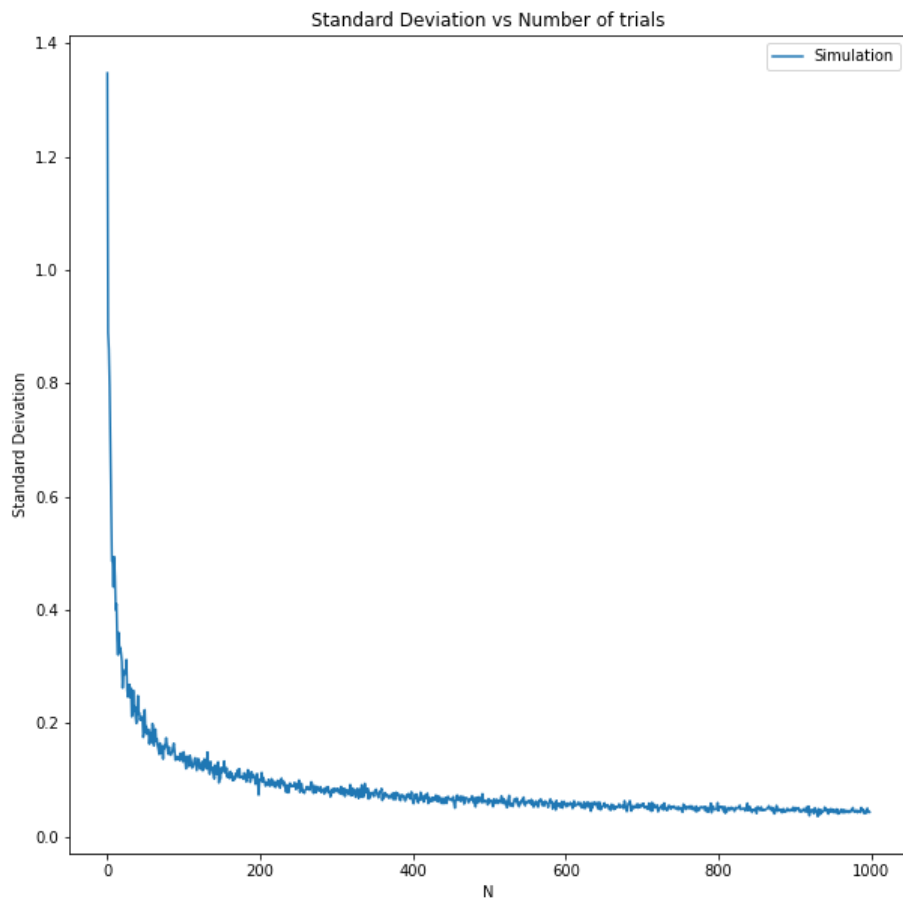
The standard deviation is proportional to $N^{-0.5}$. Hence the standard deviation is inversely proportional to square root N. The same is depicted in integration 2 also.

Integration 2

Area vs N for I2

I2 vs Trials for N=20

I2 vs Trials for N=1000

Standard Deviation vs Number of trials