Ma323-LAB 09

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This Lab assignment was done by using the values of μ = 0.0002981060700200021 and $\sigma^2 = 0.000496475360718651$ and S(0)=185.399994 as calculated in Lab 7.

For simulating the BSM model with the ratio of asset price after and before a jump should follow the log-normal distribution LN(μ , σ^2), I have used the first approach i.e. Simulating the dates to generate the path of stock prices S(t).
The stock prices S(t) were generated for N ~ Poisson (λ) for λ = 0.1.

Mean and variance of the price of avg price Asian put option calculated without using control variate with the payoff formula given in the lab assignment, and are tabulated below:

$\hat{\mu}$ (sampling mean)	$\hat{\sigma}$ (sampling variance)
21.524791304962715	623.9950622528808

The calculated 95% Confidence interval is: [-17.15082334522346, 60.200405955148895]

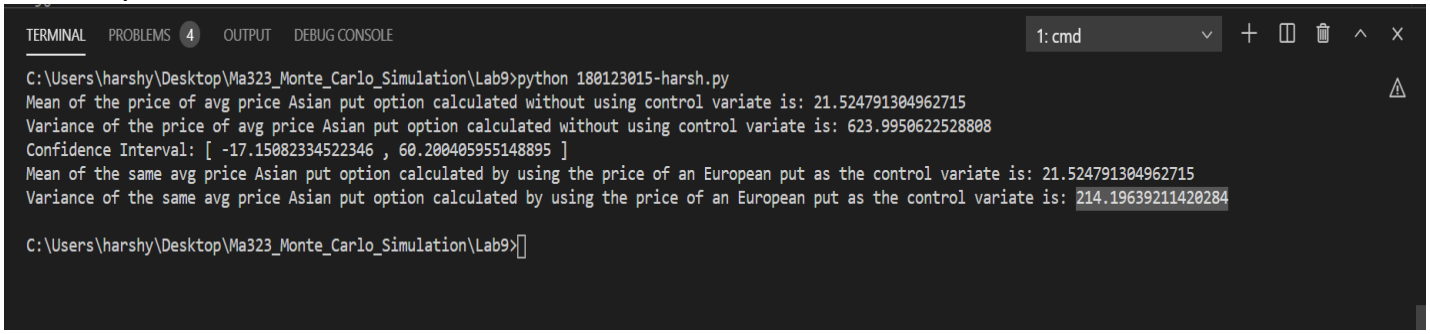
Mean and variance of the same avg price Asian put option calculated by using the price of an European put option as the control variate are tabulated below:

$\hat{\mu}$	$\hat{\sigma}$
21.524791304962715	214.19639211420284

Note:

- After introducing the control variate the variance decreases from 623.9950622528808 to 214.19639211420284.
- It can be seen that even after introducing the control variate the $\hat{\mu}$ remains same which shows that the control variate (European put option price) is an unbiased estimator.

The output of the code can be seen below:



Reference for data: https://finance.yahoo.com/quote/SBIN.NS/history/