

# Monte-Carlo Simulation Assignment: 09

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## Problem Solution:

```
naman-ubuntu@naman-ubuntu: ~/Desktop/MonteCarlo_Sem5/Lab9
naman-ubuntu@naman-ubuntu:~/Desktop/MonteCarlo_Sem5/Lab9$ python3 180123029_NamanGoyal_q.py
The calculated value of mean = 0.0002981060700200034
The calculated value of Sigma = 0.02228172705870555

Average price Asian put option (in the BSM framework) ---->
Mean of the payoffs to an Asian put option is: 18.603378623550924
Variance of the payoffs to an Asian put option is: 144.03728967593335
The 95% Confidence interval is [ 17.859514622527172 , 19.347242624574676 ]

Using the control variate ---->
The Value of b: 0.5842586819605248
Mean of the payoffs to an Asian put option is: 18.462906290545597
Variance of the payoffs to an Asian put option is: 38.505073702883955
The 95% Confidence interval is [ 18.078301179897025 , 18.84751140119417 ]
naman-ubuntu@naman-ubuntu:~/Desktop/MonteCarlo_Sem5/Lab9$
```

- **For Part1**, the value of Payoff is calculated using the formula given in the Assignment PDF. 
$$\max \left[ \left( K - \frac{1}{N+1} \sum_{i=1}^{N+1} S(t_i) \right), 0 \right]$$
 in
- **Stock Value** is Calculated using the formula for Stock Price used in the last Assignment. Using the above values **Mean**, **Variance**, and **95% Confidence Interval** is Calculated.
- **For Part2, Using Control Variables** the value of **b** is calculated using the formula given in lectures. Then the corresponding **Mean**, **Variance**, and **95% Confidence Interval** is calculated.
- In this case, the payoff will be 
$$\max [(K - S(T)) , 0].$$

Payoff of Asian Put Option	Mean	Variance	95% Confidence Interval
Part1	18.603379	144.0372896	[17.859515, 19.347243]
Part2	18.462906	38.505074	[18.078301, 18.847511]