

Q3:

We can use the Central Limit Theorem to calculate the confidence interval with one set of payoffs generated from a single Monte Carlo simulation.

Assume we already have the set of payoffs from a single run of the Monte Carlo pricer.

1. Calculate the Mean and Variance of the payoffs. Denote as μ and variance σ^2 of these payoffs

2. Compute the standard error (SE) as

$$SE = \frac{\sigma}{\sqrt{N}}, \text{ where } N \text{ is the number of simulated paths}$$

3. Use Z-Score of 95% Confidence 1.96

4. Compute the Confidence Interval as

$$Lower = \mu - 1.96 * SE$$

$$Upper = \mu + 1.96 * SE$$

5. Discount the upper and lower bound into present values using the risk free rate. The discounted bound is the 95% confidence interval for the option's current value