Numerical Methods

Monte Carlo Method

1. Compute the price of European call option using the Monte Carlo method. Use the following settings for the model: interest rate – 5%, volatility – 20%, current price – 110, strike price – 100, time to expiration – one year.
2. Produce a graph how the Monte Carlo simulations converge to the exact value of the option (which is 17.663).
3. Estimate the variance. Fix the number samples of Monte Carlo simulations (e.g. 1000). Run several MC simulations with this fixed number of samples. Plot the histogram of the distribution of the MC simulations. Compare it with the theory.
4. Implement the Antithetic reduction method for European Call.
5. Implement the Importance sampling method for European Call.
6. Implement the Control variates method for European Call.
7. Compare all these variance reduction techniques for different parameters values.