Assignment 3

Price a maximum rainbow option with the payoff $\max(\max(S_{1T}, S_{2T}, ..., S_{nT}) - K, 0)$ using the Monte Carlo simulation.
(Inputs: K, r, T, number of simulations, number of repetitions, n, S_{10}, S_{20}, ..., S_{n0}, q_1, q_2,..., q_n, σ_1, σ_2,..., σ_n, ρ_{ij}. Outputs: Option value and 95% confidence interval.)

- The basic requirement (80 points):

  Apply the Cholesky decomposition method to pricing the above rainbow option.

- Bonus 1 (5 points):

  Combine the antithetic variate approach and moment matching method to price the above rainbow option.

- Bonus 2 (10 points):

  Implement the inverse Cholesky method in Wang (2008) to price the above rainbow option.

∗ To earn bonuses 1 and 2, one should employ the approach of common random samples to show that the confidence interval generated by the bonus 2 method is narrower than that generated by the bonus 1 method, which is narrower than that generated by the basic requirement method.

- Reference

  Wang (2008), "Variance Reduction for Multivariate Monte Carlo Simulation," *Journal of Derivatives* 16, pp. 7–28.