

# Homework 3

Price a maximum rainbow option with the payoff  $\max(\max(S_{1T}, S_{2T}, \dots, S_{nT}) - K, 0)$  using the Monte Carlo simulation.

(Inputs:  $K, r, T$ , number of simulations, number of repetitions,  $n, S_{10}, S_{20}, \dots, S_{n0}, q_1, q_2, \dots, q_n, \sigma_1, \sigma_2, \dots, \sigma_n, \rho_{ij}$ . 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.

- Reference

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