Homework 4

Price a lookback put with the binomial tree model. The payoff function of the lookback put is as follows.

\[ \text{Payoff}_t = \max(S_{\text{max},t} - S_t, 0), \text{ where } S_{\text{max},t} = \max S_u, \text{ for } u = 0, \Delta t, 2\Delta t, ..., t. \]

- Basic requirement (80 points):
  (i) Implement the binomial tree model to price both European and American lookback puts.
  (ii) Implement the Monte Carlo simulation to price European lookback puts.
  (Inputs: \(S_t, r, q, \sigma, t, T, S_{\text{max},t}, n\), number of simulations, number of repetitions. Outputs: Option values for both methods and 95% confidence level for Monte Carlo simulation.)

- Bonus 1 (5 points):
  Based on the same binomial tree framework, devise and implement a quick way to determine the \(S_{\text{max}}\) list for each node.

- Bonus 2 (10 points):
  Implement the method in Cheuk and Vorst (1997) to price European and American lookback puts.

- Reference