

Mathematical Finance

Introduction to Binary Tree Models,
Stochastic Calculus and Black-Scholes Theory

Assignment 1

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Write a Python based program for computing the time 0 price of European and American put options in an N -period binary model. In the case of American put options, the program should also return the early exercise boundary. The early exercise boundary is best presented graphically as a plot consisting of points $(n, S(n))$ for all nodes of the binary tree for which the condition for early exercise of the option is satisfied, but a tabulated list of such nodes would be also be acceptable.

Test your software with the following parameters:

$$N = 300,$$

$$r = 1.3889 \times 10^{-5},$$

$$u = 3.3528 \times 10^{-3},$$

$$d = -3.3139 \times 10^{-3},$$

$$S(0) = 100,$$

$$K = 100.$$