Homework 3

Task

Write a trinomial tree program to price an up-and-out barrier put. The trinomial tree must match the barrier.

Inputs

- S: stock price
- X: strike price
- r: continuously compounded annual interest rate
- s: annual volatility
- T: time to maturity in days, which is an integer, and there are 365 days in a year
- H: up-and-out barrier
- n: number of time steps in T, which is an integer

Outputs

- The price of the up-and-out barrier put option

Example

If S = 100, X = 110, r = 0.03, s = 0.3, T = 60, H = 120, and n = 100, the output is 11.089643.

- Input format (for Python codes):
  "python3 (your_file_name).py 100 110 0.03 0.3 60 120 100"
- Output format:
  "11.089643"

Supplementary information

During evaluation, minor discrepancies are acceptable (relative absolute error < 1%).

Private testcases (released after the deadline)

1. Inputs: 100 110 0.03 0.3 60 120 100
    Outputs: 11.089643
2. Inputs: 100.0 111.1 0.055 0.099 365 122.2 50
    Outputs: 7.124132
3. Inputs: 99.9 100.0 0.066 0.088 180 111.1 25
    Outputs: 1.178105
4. Inputs: 10000 11111 0.9 0.09 30 12222 2000
    Outputs: 332.858265
5. Inputs: 1000 1111 0.09 0.9 60 1222 200
    Outputs: 160.198725