MSF 526

Illinois Institute of Technology

Homework 3

Oleksandr Shashkov

ID: A20229995

oshashko@hawk.iit.edu

**Numerical Methods for Option Pricing**

Problem 1. Implementing a binomial tree function for pricing American options in the Black-Scholes framework.

Parameters:

S0 = 40, Ks = [30, 35, 40, 45, 50], r = 0.05, T = 1,

Sigma = 0.15, q = 0.01, M = 12

Expected results from matlab:

# binprice(S0, K, r, T, dt=1/12, sigma, callput, q)

# K = [30, 35, 40, 45, 50]

# Calls = [11.0887, 6.6616, 3.1301, 1.2023, 0.3478]

# Puts = [0.0241, 0.3715, 1.7746, 5.1145, 10.0000]

Calculated prices for call options:

[11.200171 6.7285585 3.1615443 1.2144072 0.35130224]

Calculated prices for put options:

[ 0.0243059 0.37458628 1.7841662 5.1260157 10. ]

Problem 2. Implementing a finite difference scheme for pricing European options in the Black-Scholes framework using an explicit scheme.

Problem 3. Implementing a finite difference scheme for pricing American options in the Black-Scholes framework using Gauss-Seidel method to solve a Crank-Nicolson formulation of the finite difference scheme.