The University of Texas at Austin
Homework Assignment 10

Introduction to Financial Mathematics

October 31, 2026

Instructions: Provide your complete solution to the following problems. Final answers only, without appropriate justification, will receive zero points even if correct.

Binomial Option Pricing.

Two periods.

Problem 10.1. (10 points) The price movements of a non-dividend-paying stock are modeled by a binomial tree with one-year periods.

You are given that:

- the current price of the stock is $S(0) = 80$;
- $d = 0.90$, with d as in the standard notation for the binomial model;
- the risk-neutral probability of an up move is $p^* = 0.435$;
- the continuously compounded risk-free interest rate is $r = 0.03$.

The price of a two-year K-strike European put option on the stock is 13.06. Calculate K.

a. 94.00
b. 94.49
c. 95.00
d. 96.50
e. 100.77

Problem 10.2. (10 points) Bertie the analyst models the price movements of a non-dividend-paying stock by a binomial tree with one-year periods.

You are given that:

- the current price of the stock is $S(0) = S$, where S is unknown because Bertie spilt coffee on that part of his work;
- $u = 1.25$ and $d = 0.85$, with u and d as in the standard notation for the binomial model;
- the continuously compounded risk-free interest rate is $r = 0.04$.

The price Bertie had listed for a 65-strike, two-year European put option on the stock is 6.04.

Bertie remembers that the put pays off at exactly two of the three final nodes of the tree. Calculate S.

a. 58.57
b. 60.00
c. 60.36
d. 60.69
e. 61.50

Multiple periods.

Problem 10.3. (10 points) The current price of a non-dividend-paying stock is \$100 per share. Its volatility is given to be 0.2. The continuously compounded risk-free interest rate equals 0.04.

Consider a \$95-strike European put option on the above stock with nine months to expiration. Using a three-period forward binomial tree, find the price of this put option.

Problem 10.4. (10 points) The current price of a non-dividend-paying stock is \$80 per share. Its volatility is given to be 0.3. The continuously compounded risk-free interest rate equals 0.06.

Consider a \$78-strike European call option on the above stock with nine months to expiration. Using a three-period forward binomial tree, find the price of this call option.

Problem 10.5. (10 points) A **cash-or-nothing call** option with strike price K and exercise date T pays a fixed amount C at time T if $S(T) \geq K$, and pays nothing otherwise. In other words, its payoff is

$$V(T) = C \cdot \mathbb{1}_{\{S(T) \geq K\}}.$$

The current price of a non-dividend-paying stock is \$80 per share. Its volatility is given to be 0.3. The continuously compounded risk-free interest rate equals 0.06.

Consider a one-year cash-or-nothing call option on the above stock with strike price \$90 which pays \$10 if it is in-the-money at expiration. Using a four-period forward binomial tree in which every period is a quarter-year long, find the price of this cash-or-nothing call option.