The University of Texas at Austin
Homework Assignment 14

M339D Introduction to Financial Mathematics

October 23, 2026

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

Two periods.

One period [review].

Problem 14.1. *(SoA Exam FAM Sample Question #108)* A put option has strike price $K = 70$ and matures in one year.

You are given that:

- the current price of the underlying stock is $S(0) = 75$;
- the stock price in one year will be either 100 or 60;
- the true probability of an upward price movement is 40%;
- the continuously compounded risk-free interest rate is $r = 0.03$.

Calculate the price of the option.

(A) 5.51
(B) 5.82
(C) 6.53
(D) 7.92
(E) 8.27

Two periods.

Problem 14.2. For a two-period binomial model, you are given that:

- each period is one year;
- the current price of a non-dividend-paying stock S is $S(0) = \$100$;
- in each period, the stock price either goes up by 4% or goes down by 2%
- the continuously compounded risk-free interest rate is $r = 0.03$.

Consider a European put option on the above stock with strike price $K = 100$ and exercise date in two years.

Find the price of this put option.

Forward binomial tree.

Problem 14.3. You are using a two-period forward binomial tree to model the price of a non-dividend-paying stock. You are given that:

- the current stock price is $S(0) = 100$;
- the volatility of the stock is $\sigma = 0.30$;
- the continuously compounded risk-free interest rate is $r = 0.05$;
- each period is six months long.

Consider a European call option on the above stock with strike price $K = 105$ and exercise date in one year.

Find the price of this call option.

Special circumstances.

Problem 14.4. *(SoA Exam FAM Sample Question #103)* 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 $S(0) = 100$;
- $u = 1.24$, with u as in the standard notation for the binomial model;
- the risk-neutral probability of an up move is $p^* = 0.406$;
- the continuously compounded risk-free interest rate is $r = 0.02$.

The price of a two-year K-strike European put option on the stock is 25.05.

Calculate K.

(A) 123.50
(B) 124.00
(C) 124.50
(D) 125.00
(E) 125.50

Problem 14.5. For a two-period binomial model, you are given that:

- each period is one year;
- the current price of a non-dividend-paying stock S is $S(0) = \$20$;
- $u = 1.2$, with u as in the standard notation for the binomial model;
- $d = 0.8$, with d as in the standard notation for the binomial model;
- the continuously compounded risk-free interest rate is $r = 0.04$.

Consider a **special** call option which pays the excess above the strike price $K = 23$ (if any!) at the end of **every** binomial period.

Find the price of this option.