

UNIVERSITY OF TEXAS AT AUSTIN

HW Assignment 11More on binomial option pricing. More on exotic options.

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

Problem 11.1. (15 points) Consider the one-period binomial option pricing model. Let $V_C(0) > 0$ denote the price of a European call on a stock which pays continuous dividends. What is the impact on the value of European call option prices if the company decides to increase the dividend yield paid to the shareholders?

- (a) The call option price will drop.
- (b) The call option price will increase.
- (c) The call option price will always remain constant.
- (d) The impact on the price of the call cannot be determined using the binomial option pricing model.
- (e) There is not enough information provided.

Problem 11.2. (5 points) Your portfolio consists of a long up-and-in call with the barrier at 50 and a long up-and-out call with the barrier at 50. Then, in our usual notation, the initial price of your portfolio equals:

- (a) $V_C(0)$
- (b) $F_{0,T}^P(S)$
- (c) $S(T)$
- (d) $V_P(0)$
- (e) None of the above.

Problem 11.3. (8 points) Consider a non-dividend-paying stock whose current price is \$100 per share. Its volatility is given to be 0.25. You model the evolution of the stock price over the following year using a two-period forward binomial tree.

The continuously-compounded, risk-free interest rate is 0.04.

Consider a \$110-strike, one-year **down-and-in** put option with a barrier of \$90 on the above stock. What is the price of this option consistent with the above stock-price model?

- (a) About \$10.23
- (b) About \$11.55
- (c) About \$11.78
- (d) About \$11.90
- (e) None of the above.

Problem 11.4. (2 points) A compound call on a put option costs at most as much as the underlying put option itself. *True or false?*

Problem 11.5. (5 points) Let $V_{C,C}(0)$ denote the price of a compound call on a call. Let $V_{P,C}(0)$ denote the price of an otherwise identical compound put on the same call option. Let $V_C(0)$ denote the price of the underlying call option. Let $S(0)$ denote the initial price of the underlying asset for this vanilla call option.

Which one(s) of the following inequalities is (are) **always** true for the above prices?

- (a) $V_{C,C}(0) > V_{P,C}(0)$
- (b) $V_{C,C}(0) - V_{P,C}(0) \leq V_C(0)$
- (c) $V_{C,C}(0) > S(0)$
- (d) $V_C(0) > S(0)$
- (e) None of the above.

Problem 11.6. (15 pts) For a two-period binomial model, you are given that:

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

Consider a **chooser** option such that its owner can decide after one year whether the option becomes a put or a call option with exercise date at time-2 and strike equal to \$20.

Find the price of the chooser option.