

BAYLOR UNIVERSITY  
HANKAMER SCHOOL OF BUSINESS  
DEPARTMENT OF FINANCE, INSURANCE & REAL ESTATE

Options, Futures and Other Derivatives  
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Problem Set 7

Name: \_\_\_\_\_

**Problem 1.**

A stock price is currently \$70. Over each of the next two three-month periods it is expected to go up by 25% or down by 20%. The riskless interest rate is 3% per year with continuous compounding.

- A. What is the value of a six-month European put option with an exercise price of \$75?
- B. What is the value of a six-month American put option with an exercise price of \$75?

**Problem 2.**

Using a “trial-and-error” approach, estimate how high the exercise price has to be in Problem 1 for it to be optimal to exercise the option immediately.

**Problem 3.**

Consider a European call option on a non-dividend-paying stock where the stock price is \$60, the exercise price is \$55, the (annualized) risk-free rate is 2% per year, the (annualized) volatility is 40%, and the time to expiration is six months.

- A. Calculate  $u$ ,  $d$ , and  $q$  for a two timestep tree (note: assume that the tree is “recombining”; thus,  $u = e^{\sigma\sqrt{\delta t}}$  and  $d = e^{-\sigma\sqrt{\delta t}}$ ).
- B. Value the option using a two timestep tree.
- C. Verify that the “Cox-Ross-Rubinstein compared with Black-Scholes-Merton spreadsheet” (available from <http://fin4366.garven.com/spring2020/CRR-vs-BSM.xlsm>) provides the same answer.
- D. Use the “Cox-Ross-Rubinstein compared with Black-Scholes-Merton spreadsheet” (available from <http://fin4366.garven.com/spring2020/CRR-vs-BSM.xlsm>) to value the option with 5, 50, 100, and 500 time steps.