

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

Risk Management

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

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Problem Set #9

Show your work and write as legibly as possible. Good luck!

**Problem 1**

Suppose you are interested in determining arbitrage-free prices for a European call option and (otherwise identical) European put option. The underlying stock does not pay dividends, and its current price is  $S = \$18$ . For both options, the exercise price  $K = \$20$ ,  $u = e^{\sigma\sqrt{\delta t}}$ ,  $d = e^{-\sigma\sqrt{\delta t}}$ , and the length of each timestep is  $\delta t = 1/4$ . Furthermore, the riskless rate of interest  $r = 4\%$  per year, the underlying stock's volatility  $\sigma = 25\%$  per year, and both options expire 1 year from today.

A. (30 points) What is the arbitrage-free price for the call option?

B. (20 points) What is the arbitrage-free price for the put option?

Problem 2. For this problem, the following set of definitions applies:

$C$  = current (European) call option price;

$P$  = current (European) put option price;

$S$  = current price of a non-dividend paying stock (underlying asset for both options);

$K$  = exercise price (common to both options);

$r$  = annualized riskless rate of interest;

$T$  = time (in terms of number of years) to expiration; and

$\sigma$  = annualized standard deviation of underlying asset's rate of return.

For each of the following scenarios (A through D), calculate the missing variable(s):

<b><i>Scenario</i></b>	<b><i>C</i></b>	<b><i>P</i></b>	<b><i>S</i></b>	<b><i>K</i></b>	<b><i>r</i></b>	<b><i><math>\sigma</math></i></b>	<b><i>T</i></b>
A	?	?	\$18	\$20	4%	25%	1.00
B	\$2.96	\$1.98	?	\$25	4%	25%	1.00
C	\$5.60	\$1.42	\$33	?	4%	25%	1.00
D	\$2.38	\$3.60	\$18	\$20	4%	?	1.00

A. SCENARIO A (20 points)

B. SCENARIO B (10 points)

C. SCENARIO C (10 points)

D. SCENARIO D (10 points)