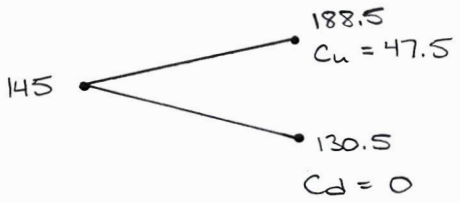
HW 10.2 (a) Key

1. Prices for a nondividend-paying stock are modeled with a 1-period binomial tree. You are given the following information:
(1) The period is one year.
(2) The stock's current price is 145
(3) $u = 1.3$ and $d = 0.9$.
(4) The continuously compounded risk-free rate is 5%.
Find the number of shares of stock in the replicating portfolio for a one year call option with a strike price of 141. [206-01]

[A] 0.819 B) 0.688 C) 0.721 D) 0.753 E) 0.786



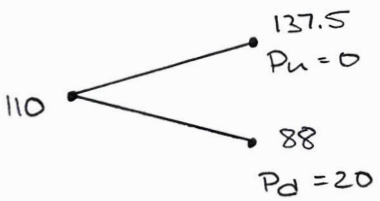
$$\Delta = \frac{C_u - C_d}{S_u - S_d} e^{-\delta t}$$

$$= \frac{47.5}{58}$$

$$= \boxed{0.8190}$$

2. Prices for a nondividend-paying stock are modeled with a 1-period binomial tree. You are given the following information:
(1) The period is one year.
(2) The stock's current price is 110
(3) $u = 1.25$ and $d = 0.8$.
(4) The continuously compounded risk-free rate is 6%.
Find the number of shares of stock in the replicating portfolio for a one year put option with a strike price of 108. [206-02]

[A] –0.404 B) –0.420 C) –0.436 D) –0.453 E) –0.469



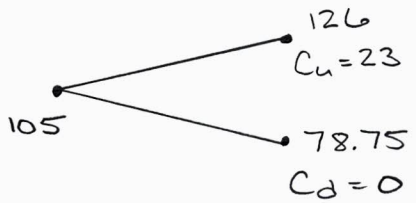
$$\Delta = \frac{P_u - P_d}{S_u - S_d} e^{-\delta t}$$

$$= \frac{-20}{49.5}$$

$$= \boxed{-0.4040}$$

3. Prices for a nondividend-paying stock are modeled with a 1-period binomial tree. You are given the following information:
(1) The period is one year.
(2) The stock's current price is 105
(3) $u = 1.2$ and $d = 0.75$.
(4) The continuously compounded risk-free rate is 3.5%.
Determine the amount of money lent in the replicating portfolio for a one year call option with a strike price of 103. [206-03]

A) –37.01 B) –35.53 C) –38.50 D) –39.98 E) –41.46



$126\Delta + Be^{0.035} = 23$

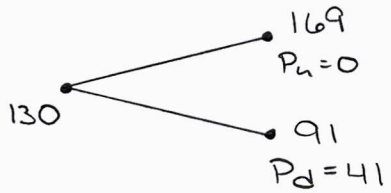
$78.75\Delta + Be^{0.035} = 0$

$\Delta = 0.4868$

$B = \boxed{-37.01}$

4. Prices for a nondividend-paying stock are modeled with a 1-period binomial tree. You are given the following information:
(1) The period is one year.
(2) The stock's current price is 130
(3) $u = 1.3$ and $d = 0.7$.
(4) The continuously compounded risk-free rate is 3%.
Determine the amount of money lent in the replicating portfolio for a one year put option with a strike price of 132. [206-04]

A) 86.21 B) 89.66 C) 93.10 D) 96.55 E) 100.00



$169\Delta + Be^{0.03} = 0$

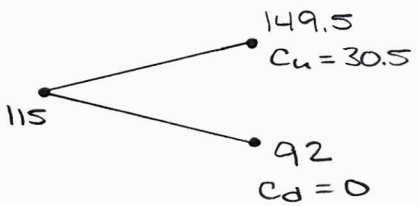
$91\Delta + Be^{0.03} = 41$

$\Delta = -0.5256$

$B = \boxed{86.21}$

5. Prices for a nondividend-paying stock are modeled with a 1-period binomial tree. You are given the following information:
(1) The period is one year.
(2) The stock's current price is 115
(3) $u = 1.3$ and $d = 0.8$.
(4) The continuously compounded risk-free rate is 6%.
Find the premium for a one year call option with a strike price of 119. [206-05]

A) 15.04 B) 14.44 C) 15.64 D) 16.24 E) 16.84



$149.5\Delta + Be^{0.06} = 30.5$

$92\Delta + Be^{0.06} = 0$

$\Delta = 0.5304$

$B = -45.96$

$Call = 115\Delta + B = \boxed{15.04}$