

Advanced Derivatives Questions

1. Consider a European call option and a European put option on a nondividend-paying stock. You are given:
- (i) The current price of the stock is 60.
 - (ii) The call option currently sells for 0.15 more than the put option.
 - (iii) Both the call option and put option will expire in 4 years.
 - (iv) Both the call option and put option have a strike price of 70.

Calculate the continuously compounded risk-free interest rate.

- (A) 0.039
- (B) 0.049
- (C) 0.059
- (D) 0.069
- (E) 0.079

****BEGINNING OF EXAMINATION****
ACTUARIAL MODELS – FINANCIAL ECONOMICS SEGMENT

- 1.** On April 30, 2007, a common stock is priced at \$52.00. You are given the following:
- (i) Dividends of equal amounts will be paid on June 30, 2007 and September 30, 2007.
 - (ii) A European call option on the stock with strike price of \$50.00 expiring in six months sells for \$4.50.
 - (iii) A European put option on the stock with strike price of \$50.00 expiring in six months sells for \$2.45.
 - (iv) The continuously compounded risk-free interest rate is 6%.

Calculate the amount of each dividend.

- (A) \$0.51
- (B) \$0.73
- (C) \$1.01
- (D) \$1.23
- (E) \$1.45

53.

For each ton of a certain type of rice commodity, the four-year forward price is 300. A four-year 400-strike European call option costs 110.

The continuously compounded risk-free interest rate is 6.5%.

Calculate the cost of a four-year 400-strike European put option for this rice commodity.

- (A) 10.00
- (B) 32.89
- (C) 118.42
- (D) 187.11
- (E) 210.00

54.

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55.

Box spreads are used to guarantee a fixed cash flow in the future. Thus, they are purely a means of borrowing or lending money, and have no stock price risk.

Consider a box spread based on two distinct strike prices (K, L) that is used to lend money, so that there is a positive cost to this transaction up front, but a guaranteed positive payoff at expiration.

Determine which of the following sets of transactions is equivalent to this type of box spread.

- (A) A long position in a (K, L) bull spread using calls and a long position in a (K, L) bear spread using puts.
- (B) A long position in a (K, L) bull spread using calls and a short position in a (K, L) bear spread using puts.
- (C) A long position in a (K, L) bull spread using calls and a long position in a (K, L) bull spread using puts.
- (D) A short position in a (K, L) bull spread using calls and a short position in a (K, L) bear spread using puts.
- (E) A short position in a (K, L) bull spread using calls and a short position in a (K, L) bull spread using puts.

5.

The PS index has the following characteristics:

- One share of the PS index currently sells for 1,000.
- The PS index does not pay dividends.

Sam wants to lock in the ability to buy this index in one year for a price of 1,025. He can do this by buying or selling European put and call options with a strike price of 1,025.

The annual effective risk-free interest rate is 5%.

Determine which of the following gives the hedging strategy that will achieve Sam's objective and also gives the cost today of establishing this position.

- (A) Buy the put and sell the call, receive 23.81
- (B) Buy the put and sell the call, spend 23.81
- (C) Buy the put and sell the call, no cost
- (D) Buy the call and sell the put, receive 23.81
- (E) Buy the call and sell the put, spend 23.81

6.

The following relates to one share of XYZ stock:

- The current price is 100.
- The forward price for delivery in one year is 105.
- P is the expected price in one year

Determine which of the following statements about P is TRUE.

- (A) $P < 100$
- (B) $P = 100$
- (C) $100 < P < 105$
- (D) $P = 105$
- (E) $P > 105$