SPREADS

King Saud University
Mathematics Department | ACTU461
Exercise's Lecture (11)
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Spreads

An option spread is a combination of only calls or only puts, in which some options are bought and some others are sold. To create portfolios useful for many different objectives.

A ratio spread

is a combination of buying m calls at one strike price and selling n calls at a different strike price

And same expiration date.

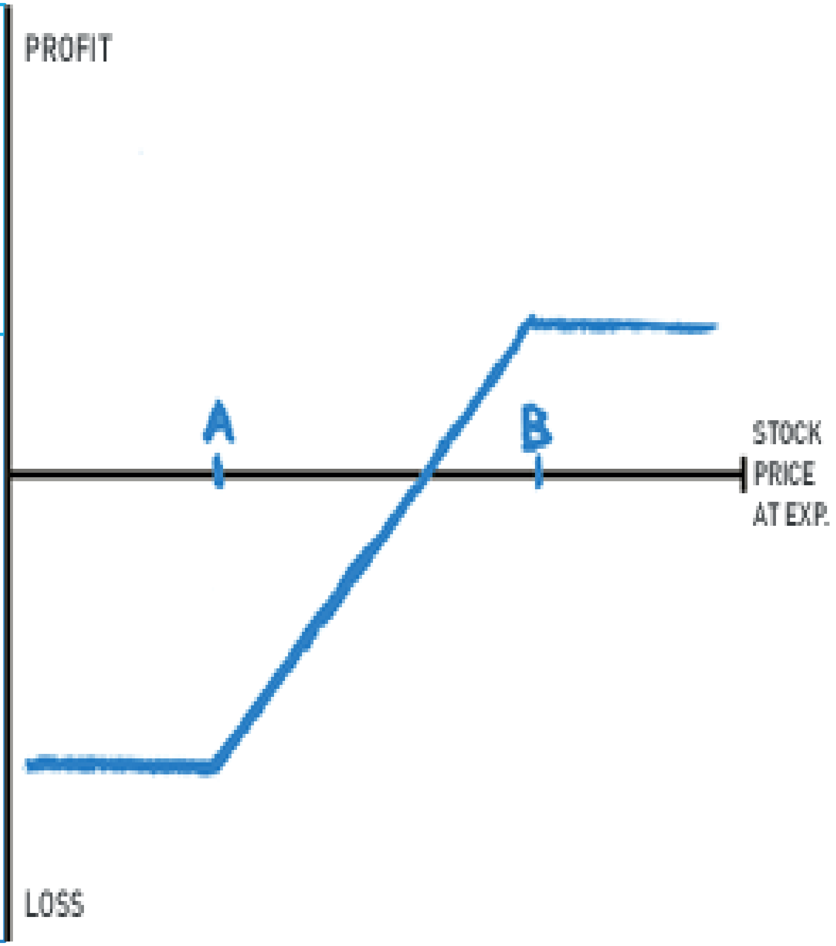
BULL SPREAD

Speculating on the increase of an asset price. Although investor gives up a portion of his profit on the purchased call, this is offset by the premium received for selling the call

Buying a K1–strike Call and Selling a K2–strike Call,
Or
Buying a K1–strike Put and Selling a K2–strike Put.

Both, - Same expiration date
- Same nominal amount

where $0 < K1 < K2$



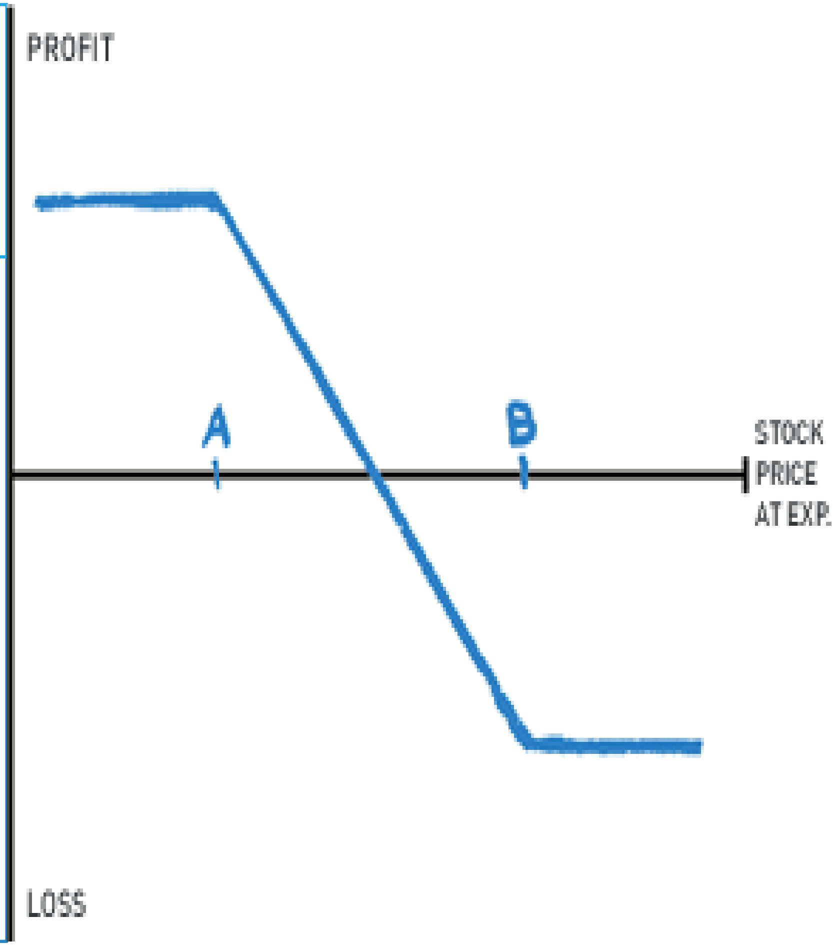
BEAR SPREAD

Speculating on the decrease of an asset, price Graph is reflection of that of a bull spread about the horizontal axis

Selling a K1–strike call and Buying a K2–strike Call,
Or
Selling a K1–strike Put and Buying a K2–strike Put.

Both, - Same expiration date
- Same nominal amount

where $0 < K1 < K2$



COLLARED STOCK

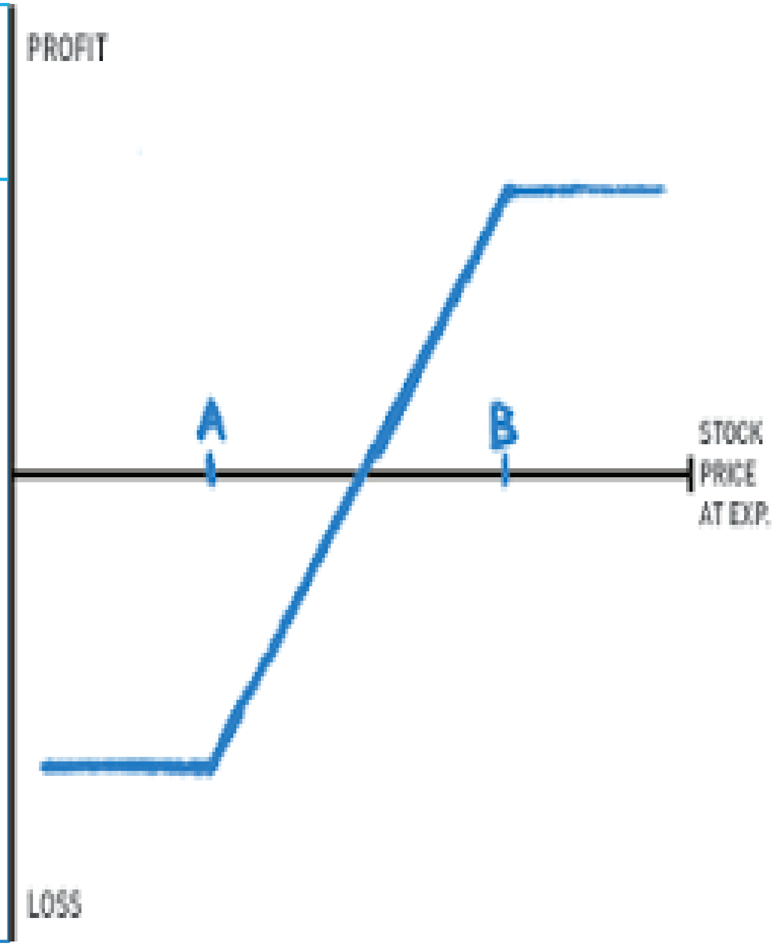
Collars are used to insure a long position on a stock.

A Collared Stock consists of:

Long Index + Collar

Buying the Index and Buying K1 Put , Selling a K2–strike Call.

where 0 < K1 < K2



WRITTEN COLLAR

Buy at-the-money Put Option with strike price K1 + Sell out-of-the-money Call Option with strike price K2, where K2>K1.

A Written Collar consists of:

Selling a K1–strike Put and Buying a K2–strike Call,

where $0 < K1 < K2$

STRADDLE

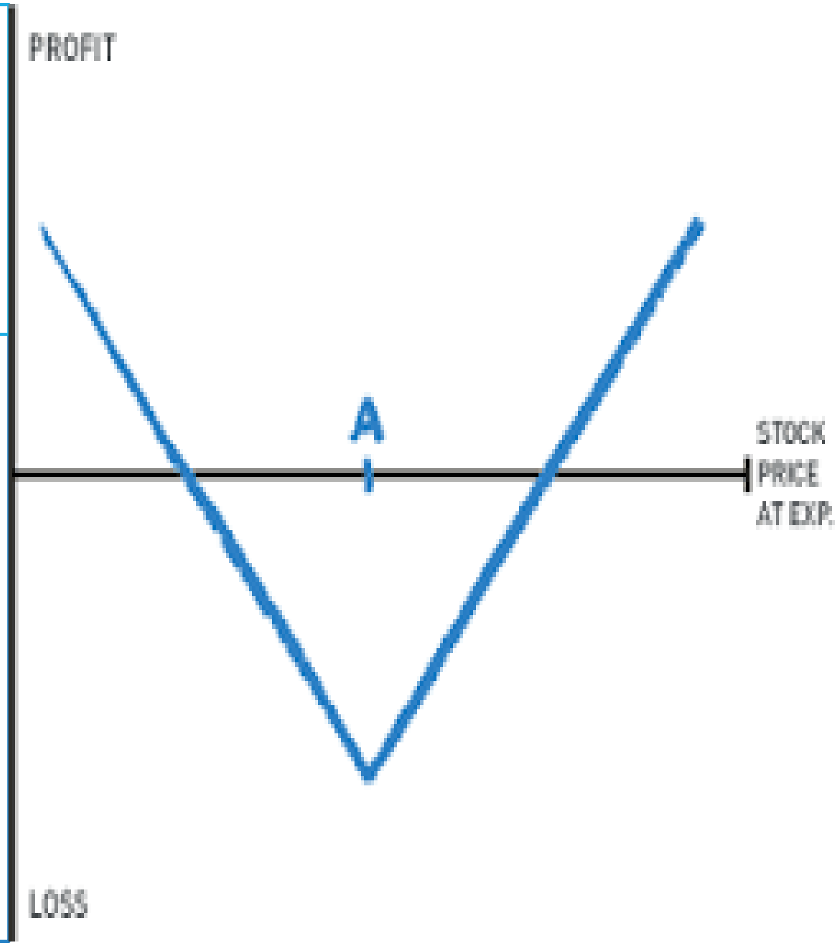
A straddle is used to bet that the volatility of the market is higher than the market's assessment of volatility. Guaranteed payoff as long as ST is different than K.

A Straddle consists of:

Buying a K–strike call and a K–strike Put with

Both, - Same strike price

- Same nominal amount



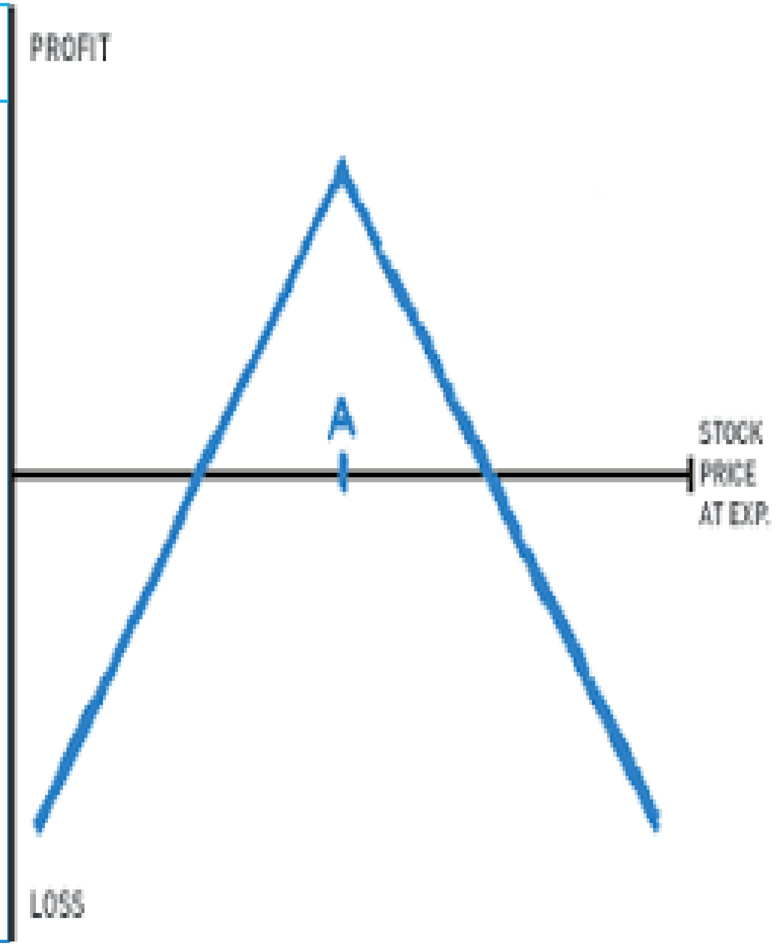
WRITTEN STRADDLE

Bet on low volatility .

A Writtin Straddle consists of:

Selling a K–strike call and a K–strike Put with

Both, - Same strike price
- Same nominal amount



STRANGLE

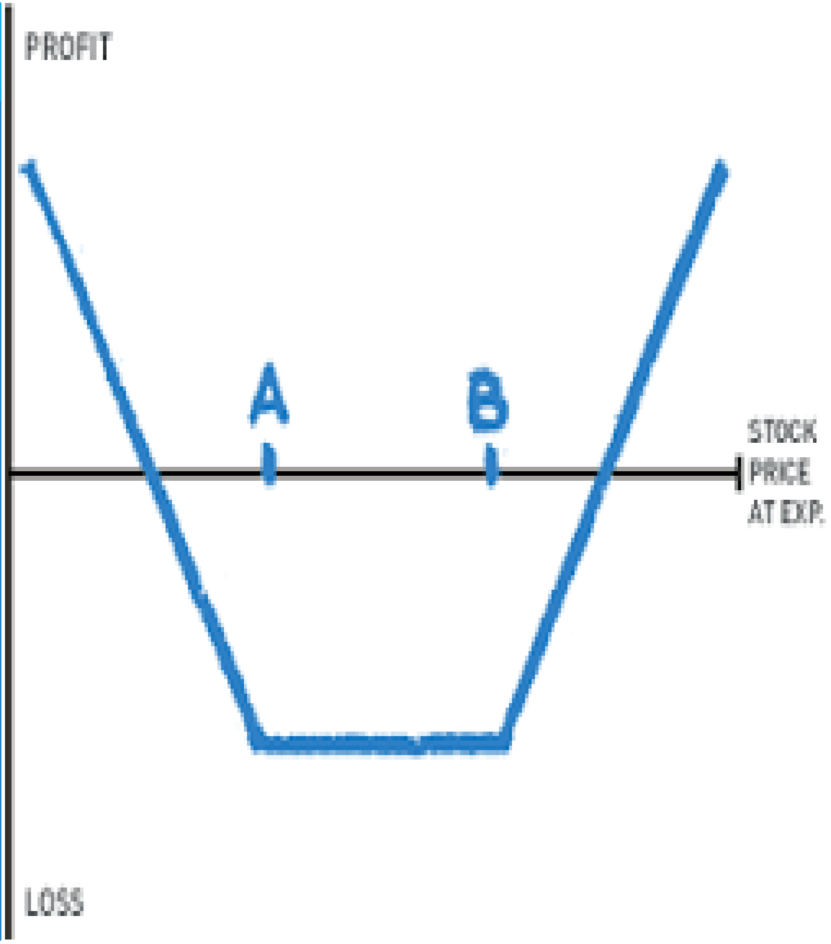
Bet on high volatility with lower cost.

A strangle consists on:

Buying a K1–strike Put and a K2–strike Call

Both, - same expiration date

where 0 < K1 < K2



WRITTEN STRANGLE

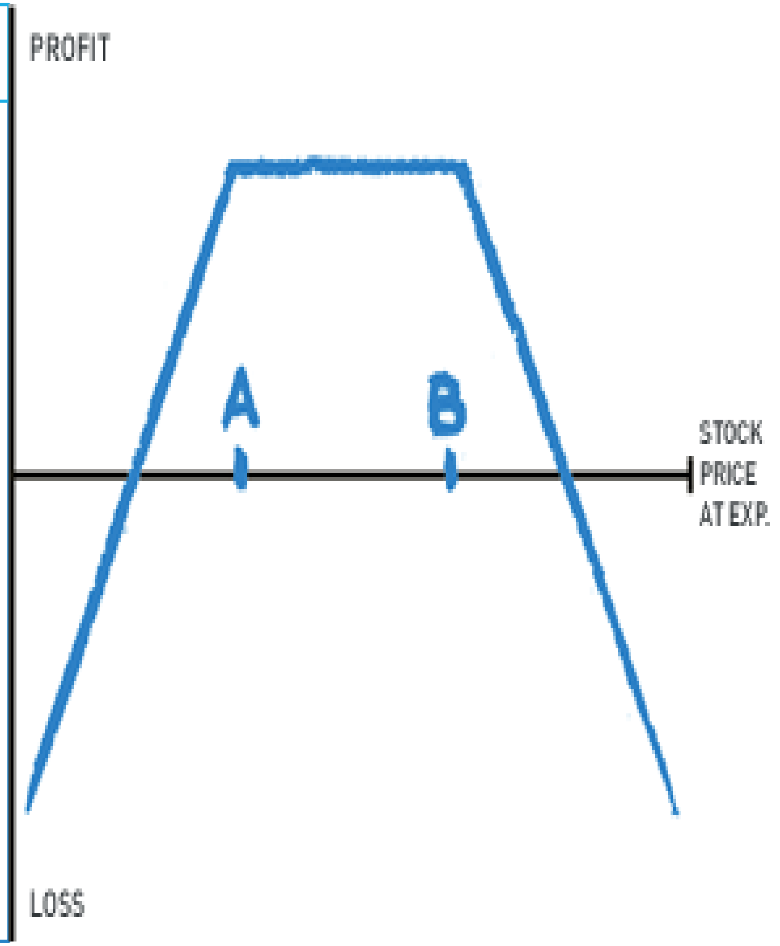
A written strangle is a bet on low volatility

A written strangle consists on:

Selling a K1–strike Call and a K2–strike Put

Both, - same expiration date

where $0 < K1 < K2$



BUTTERFLY SPREAD

Bet on low volatility with lower cost. The upper and lower strike prices are equal distance from the middle.

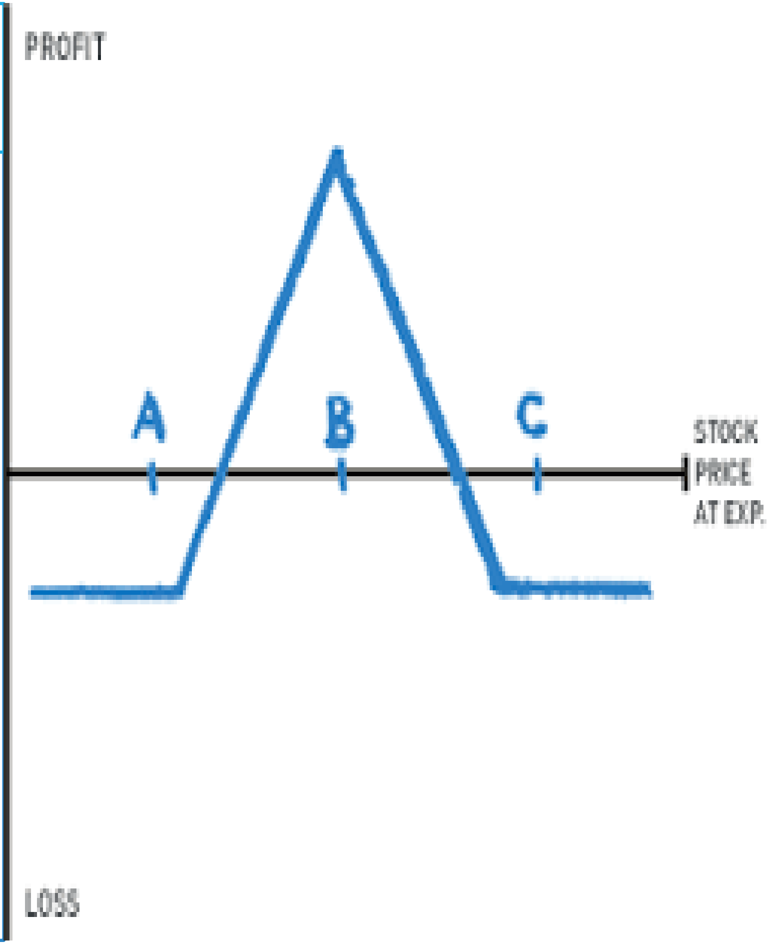
A butterfly spread consists on:

Write a straddle and buy strangle

Selling a K2–strike Call and a K2–strike Put,

Buying a K1–strike Call and a K3–strike Put.

where $0 < K1 < K2<K3$



BOX SPREAD

Guarantees cash flow into the future. Purely a means of borrowing or lending money

A box spread consists of:

Creating a synthetic long forward in k1 strike price,

And a synthetic short forward in k2 strike price.

Buying a k1–strike Call and selling k1–strike Put,

And Buying a k2-Strike Put and selling a k2-strike Call.

At time T, a payment of K1 − K2 per share is obtained.

If k1 < k2 , a box spread is a way to lend money.

If k1 > k2 , a box spread is a way to borrow money

Joe believes that the volatility of a stock is higher than indicated by market prices for options on that stock. He wants to speculate on that belief by buying or selling at-the-money options.

Determine which of the following strategies would achieve Joe’s goal.

(A) Buy a strangle
(B) Buy a straddle
(C) Sell a straddle
(D) Buy a butterfly spread
(E) Sell a butterfly spread

The current price of a non-dividend paying stock is 40 and the continuously compounded risk-free interest rate is 8%. The following table shows call and put option premiums for three-month European of various exercise prices:

Exercise Price	Call Premium	Put Premium
35	6.13	0.44
40	2.78	1.99
45	0.97	5.08

A trader interested in speculating on volatility in the stock price is considering two investment strategies. The first is a 40-strike straddle. The second is a strangle consisting of a 35-strike put and a 45-strike call.

Determine the range of stock prices in 3 months for which the strangle outperforms the straddle.

MFE PAST EXAMS | Q 16

Determine which of the following strategies creates a ratio spread, assuming all options are European.

(A) Buy a one-year call, and sell a three-year call with the same strike price.
(B) Buy a one-year call, and sell a three-year call with a different strike price.
(C) Buy a one-year call, and buy three one-year calls with a different strike price
(D) Buy a one-year call, and sell three one-year puts with a different strike price.
(E) Buy a one-year call, and sell three one-year calls with a different strike price.

You are given:

i) An investor short-sells a non-dividend paying stock that has a current price of 44 per share.

ii) This investor also writes a collar on this stock consisting of a 40-strike European put option and a 50-strike European call option, Both options expire in one year.

iii) The prices of the options on this stock are:

Strike Price	Call option	Put option
40	8.42	2.47
50	3.86	7.42

iv) The continuously compounded risk-free interest rate is 5%.

Calculate the maximum profit for the overall position at expiration.

(A) 2.61 (B) 3.37

(C) 4.79 (D) 5.21

MFE PAST EXAMS | Q 43

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.

MFE PAST EXAMS | Q 55

The current price of a stock is 40. The continuously compounded risk-free rate and dividend rate are r = 0.03 and Delta = 0.01. The price of an at-the-money 3-month call is 2.48. An investor buys the at-the-money 3-month call and put.

a) Give the name of this combined position and the graph.
b)What is the minimum profit?

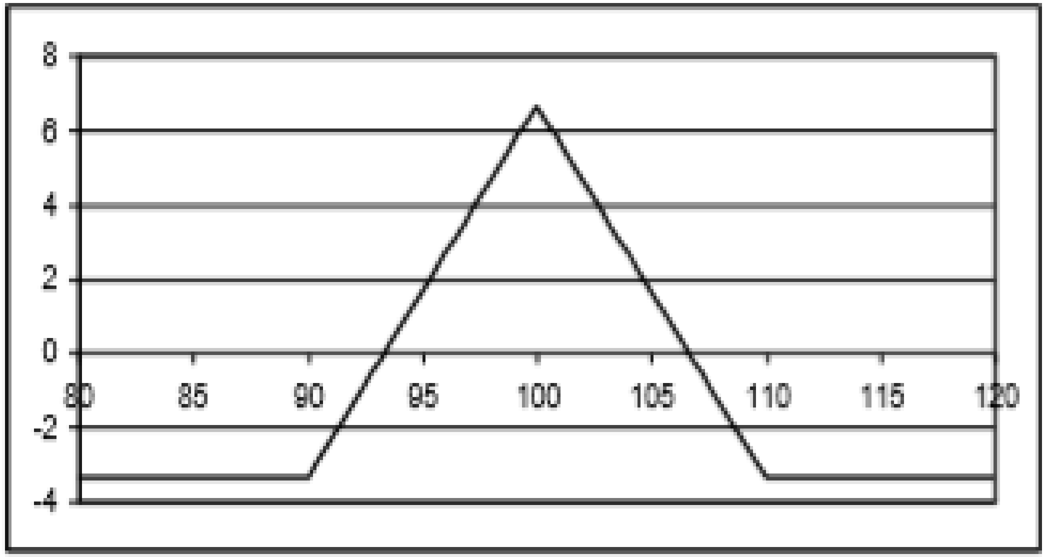
9.

Stock ABC has the following characteristics:

- The current price to buy one share is 100.
- The stock does not pay dividends.
- European options on one share expiring in one year have the following prices:

Strike Price	Call option price	Put option price
90	14.63	0.24
100	6.80	1.93
110	2.17	6.81

A butterfly spread on this stock has the following profit diagram.



The continuously compounded risk-free interest rate is 5%.

Determine which of the following will NOT produce this profit diagram.

(A) Buy a 90 put, buy a 110 put, sell two 100 puts

(B) Buy a 90 call, buy a 110 call, sell two 100 calls

(C) Buy a 90 put, sell a 100 put, sell a 100 call, buy a 110 call

(D) Buy one share of the stock, buy a 90 call, buy a 110 put, sell two 100 puts

MFE PAST EXAMS | Q 9

The current price of a stock index is 1000. The following table shows call and put option premiums for six months European options of various exercise prices:

Exercise Price	Call Premium	Put Premium
950	120.41	51.78
1000	93.81	74.20
1050	71.80	101.21

Strategy 1 is to sell the 950-strike put and to buy 1,050-strike call
Strategy 2 is to buy the 950-strike put and to sell 1,050-strike call
Strategy 3 is to buy the 950-strike call and to sell 1,050-strike call
Strategy 4 is to buy 950-strike call, sell the 1,000 -strike call, sell the 950-strike put and buy the 1,000-strike put.

Determine which, if any, of these strategies will have greater payoffs in six months for higher prices of the stock index than for relatively lower prices.

PAST ACTU461 EXAMS