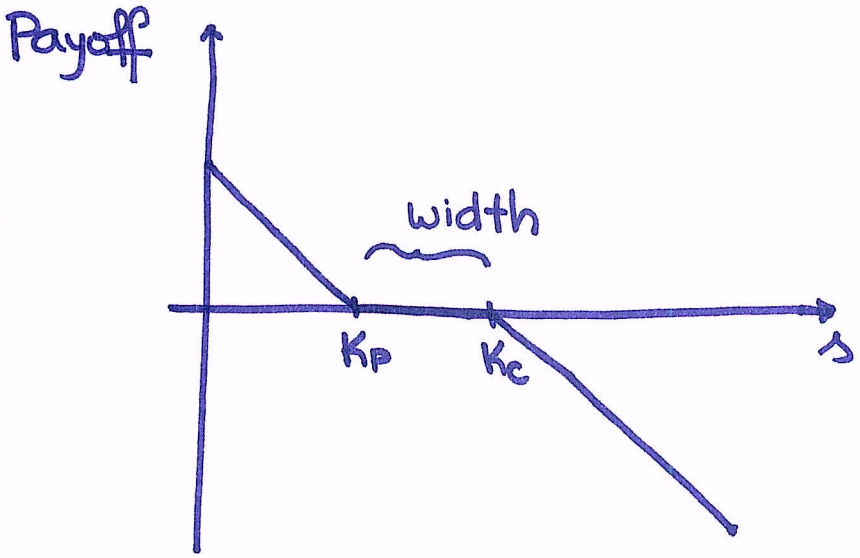
D: April 5th, 2019.

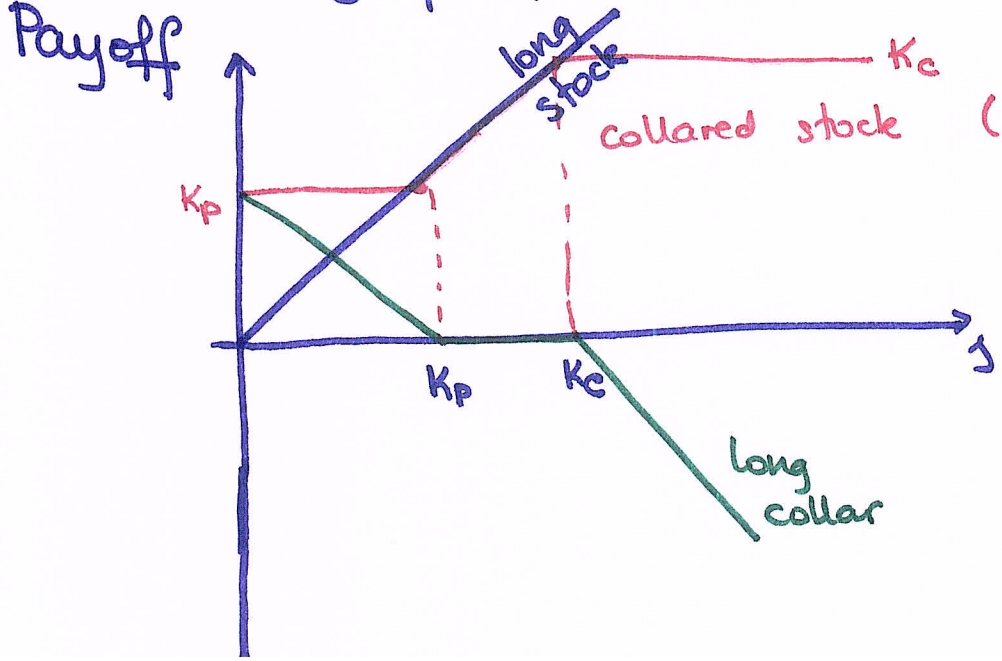
Collars [review].

Let $K_P \leq K_C$.

{ • LONG the K_P-strike put
• WRITE/SHORT the K_C-strike call } European; otherwise identical



We use the long collar to hedge a long stock.
The resulting portfolio is a collared stock.



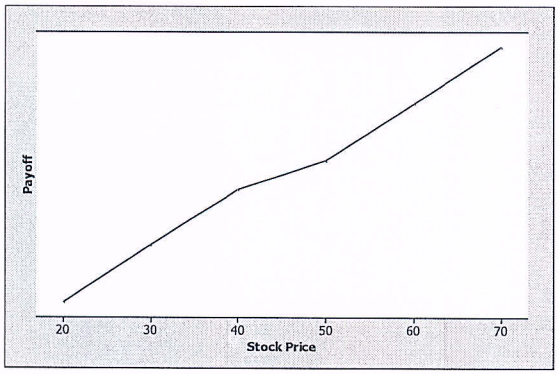
59.

An investor has a long position in a non-dividend-paying stock, and additionally, has a long collar on this stock consisting of a 40-strike put and 50-strike call.

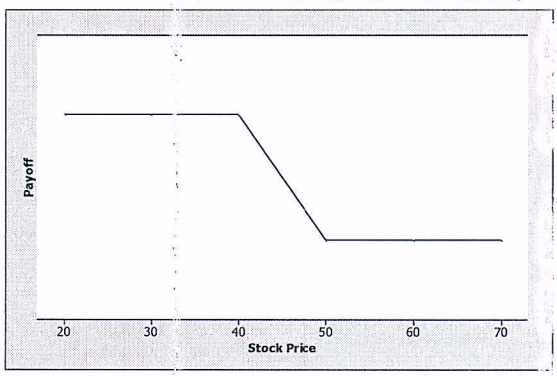
Determine which of these graphs represents the payoff diagram for the overall position at the time of expiration of the options.

bear spread + bond = short collared stock

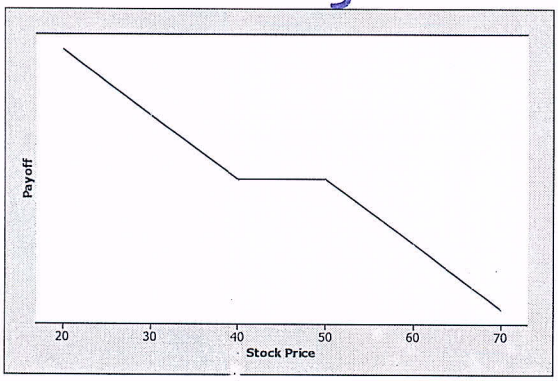
(A) X



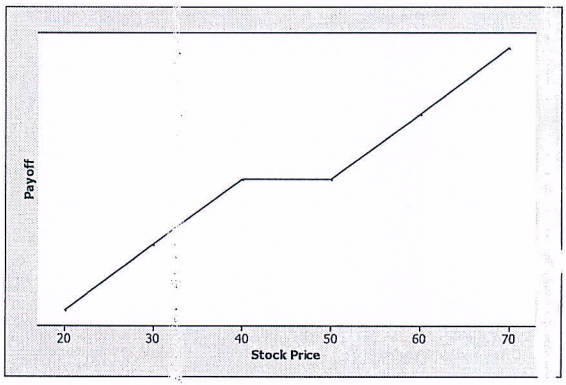
(B)



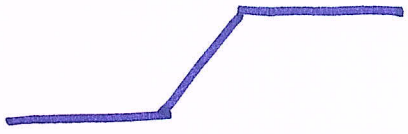
(C) "naked" long collar



(D) "naked" short collar

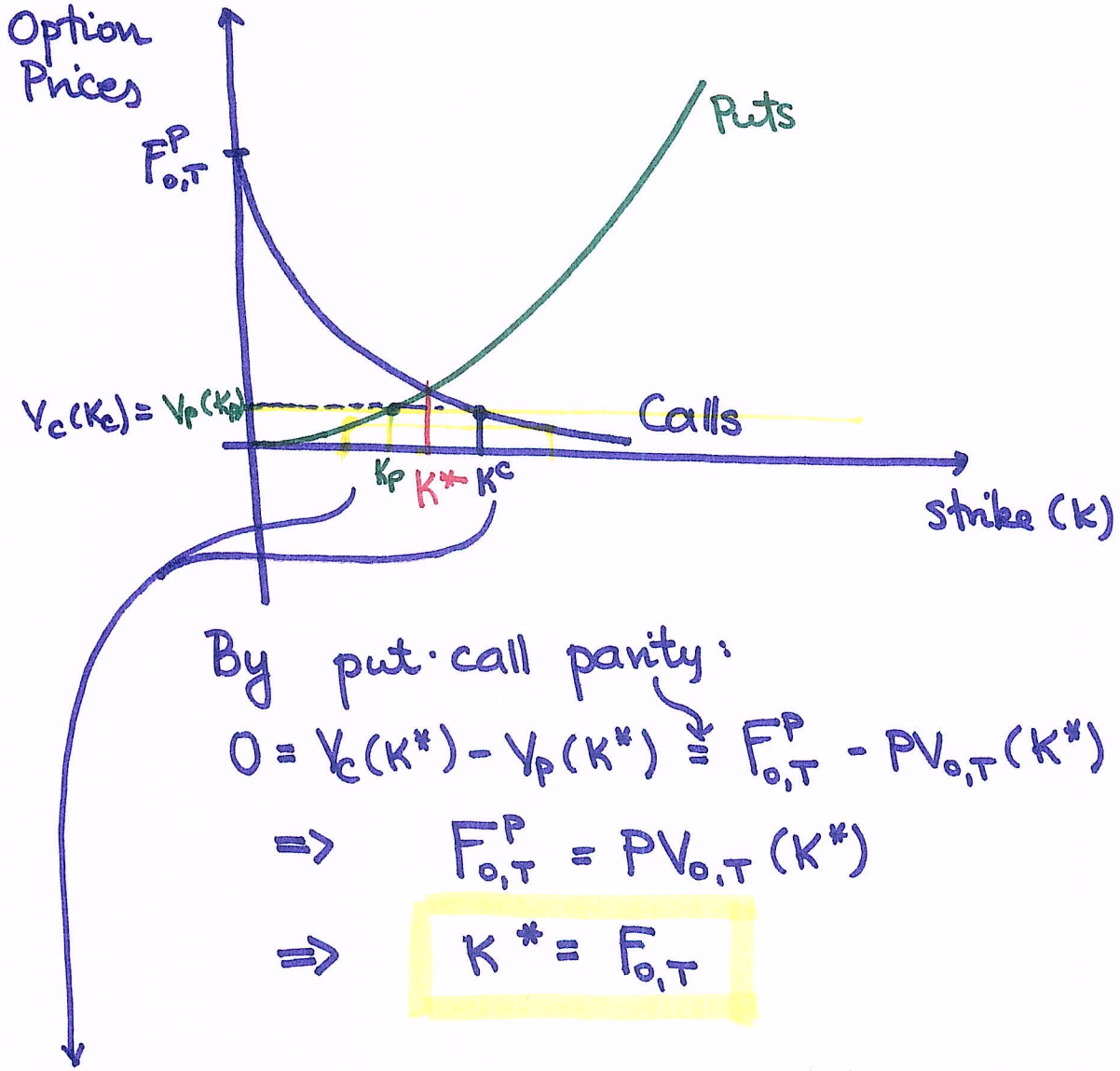


(E) ✓



2.

Zero-Cost Collars



By put-call parity:

$$0 = V_c(K^*) - V_p(K^*) \overset{\text{parity}}{=} F^P_{0,T} - PV_{0,T}(K^*)$$

$$\Rightarrow \quad F^P_{0,T} = PV_{0,T}(K^*)$$

$$\Rightarrow \quad \boxed{K^* = F_{0,T}}$$

For each pair K_p & K_c obtained as above, we end up w/ a (K_p, K_c)-collar whose cost is ZERO.

We have infinitely many zero-cost collars.

Ratio Spreads.

Let $K_1 < K_2$

- LONG m calls w/ strike K_1
- SHORT/WRITE n calls w/ strike K_2

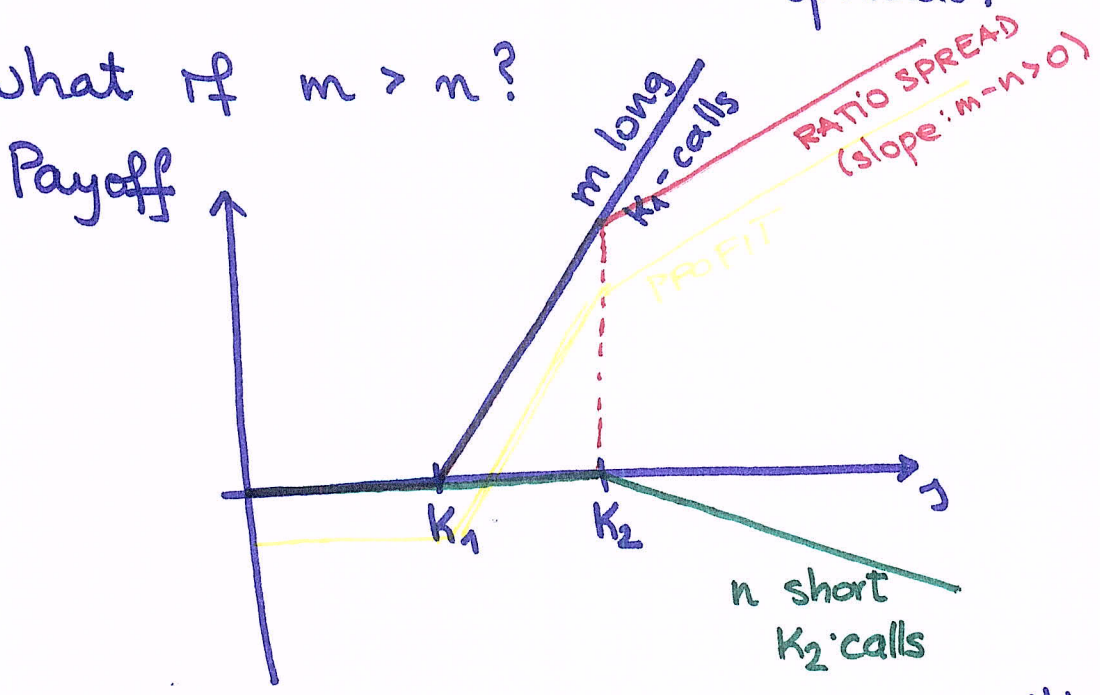
} European; otherwise identical

w/ m and n positive constants; usually integers.

Q: What if $m = n$?

It's like m call bull spreads.

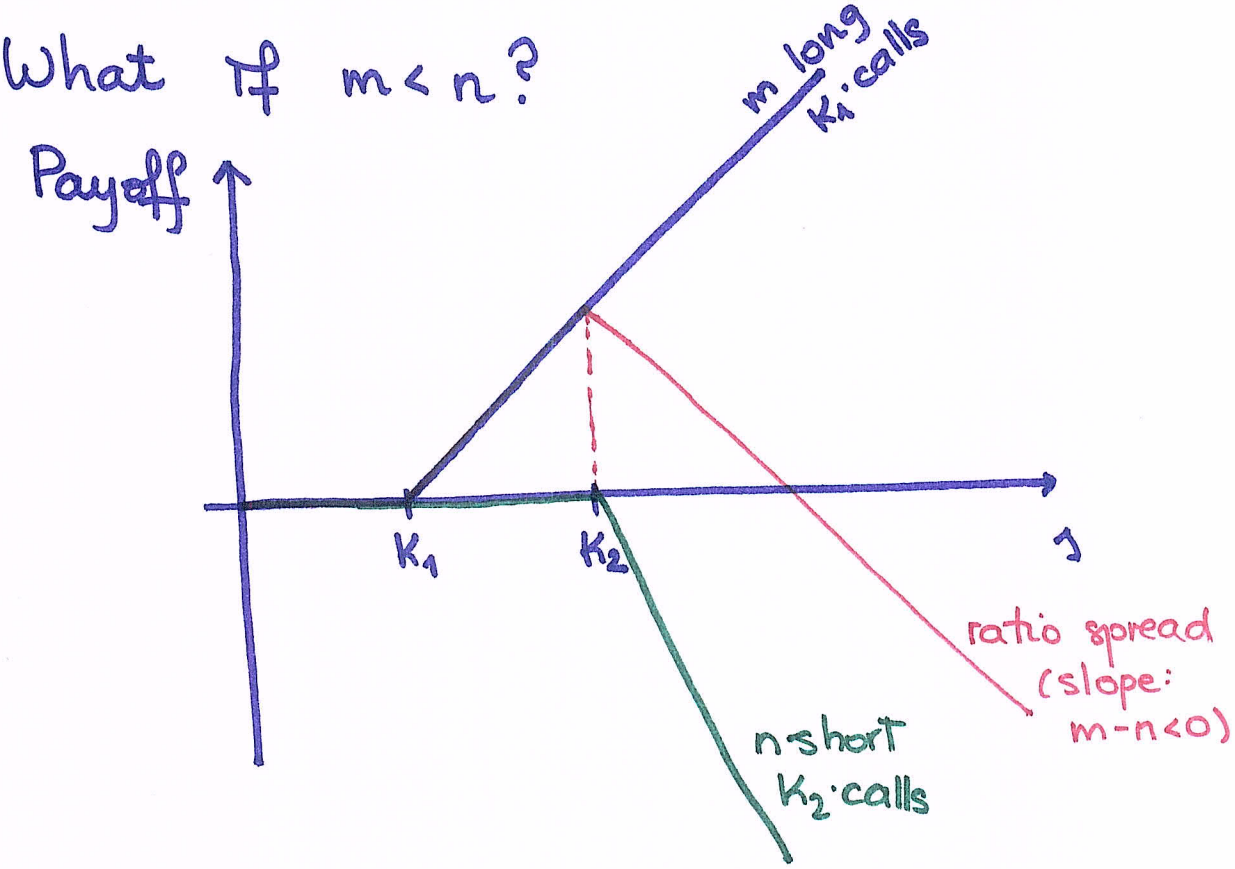
Q: What if $m > n$?



Q: Who would trade in this position?

- Speculators on higher prices.
- Long w.r.t. the underlying
  => Use it to hedge a short position.

Q: What if $m < n$?



Q: Who would invest in this ratio spread?

- Arbitrageur ✗ No lower bound!
- Speculator: Low volatility & low likelihood of high prices
- Hedger ✗ No directionality!

38.

The current price of a medical company's stock is 75. The expected value of the stock price in three years is 90 per share. The stock pays no dividends.

You are also given

i) The risk-free interest rate is positive.

ii) There are no transaction costs.

iii) Investors require compensation for risk.

The price of a three-year forward on a share of this stock is X, and at this price an investor is willing to enter into the forward.

Determine what can be concluded about X.

(A) $X < 75$

(B) $X = 75$

(C) $75 < X < 90$

(D) $X = 90$

(E) $90 < X$

39.

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

calendar spreads

(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.

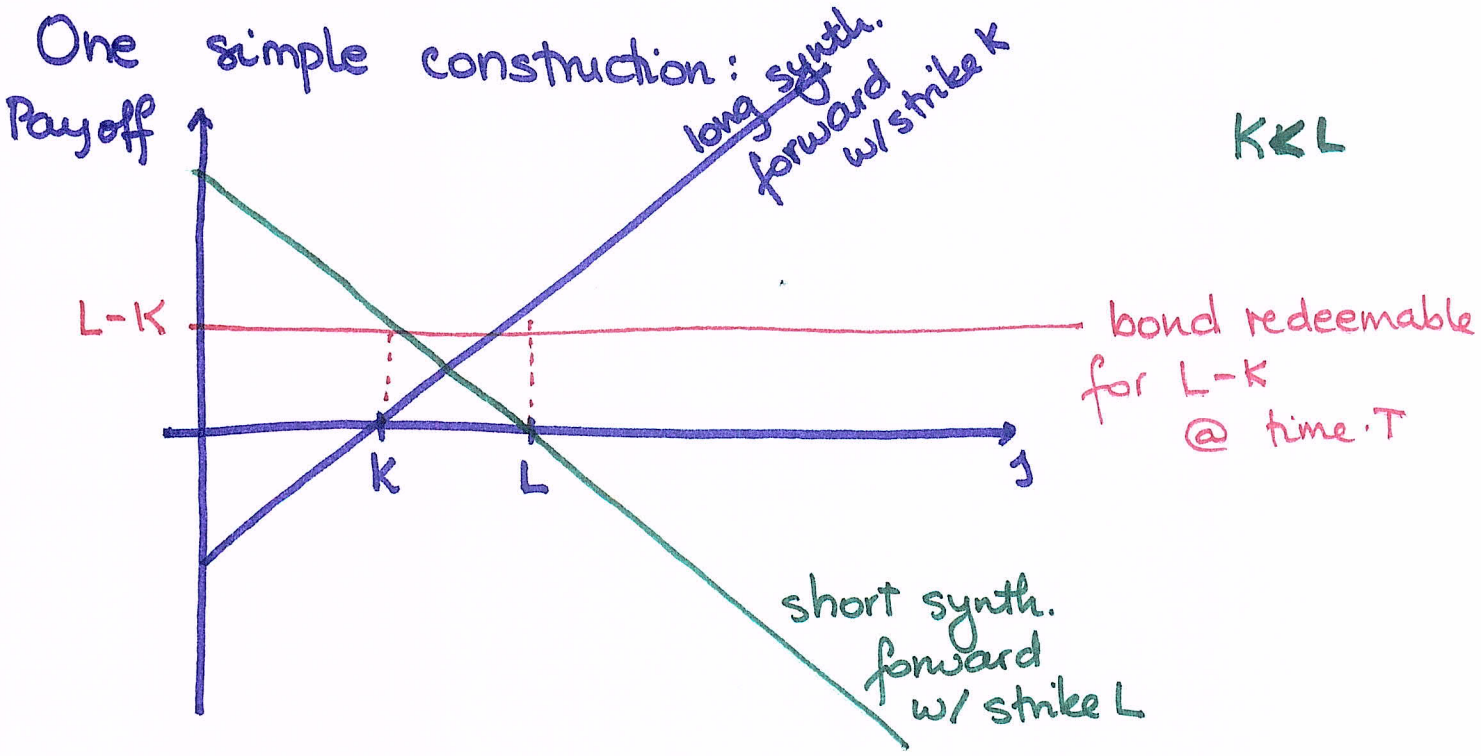
long call + long bond
=
long put + long stock

6.

Box Spreads

... replicate a bond

One simple construction:



Put-call Parity:

- long a K-strike call* } LONG synthetic forward w/ strike K
- short a K-strike put* }
- short an L-strike call* } SHORT synthetic forward w/ strike L
- long an L-strike put* }

Box Spread:

* LONG (K,L)-call bull spread
* LONG (K,L)-put bear spread

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.

DELETED

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.

8.

Spreads etc.

				arbitrage p.
call bull spreads	↗	≥ 0		monot.
put bull —11—	↗	≤ 0		cord slope
call bear —11—	↙	≤ 0		cord slope
put bear —11—	↙	≥ 0		monot.

(+ hedging)

butterfly spreads — convexity
+ speculation on low vol.

straddles + strangles
speculation on high vol

- collars
- ratio spreads
- box spreads