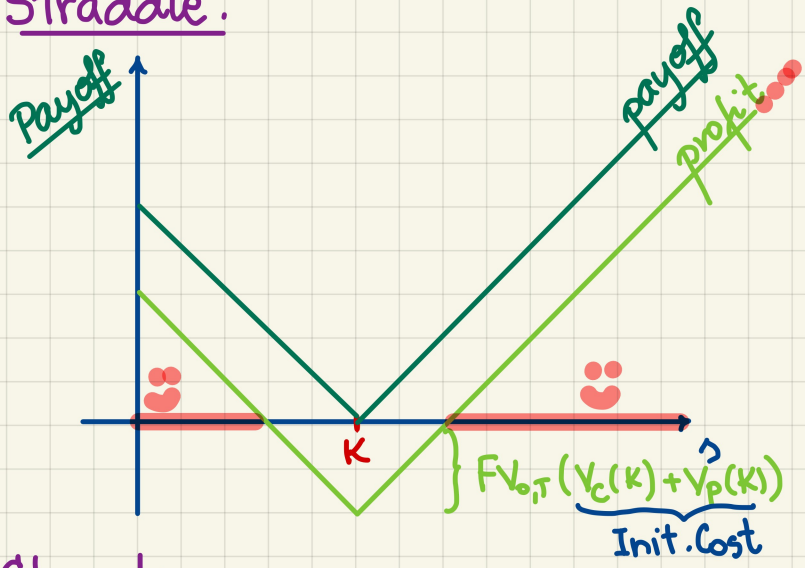
M339D: April 4th, 2022.

Speculating on Volatility.

If one wants to speculate on low volatility, one should use a long butterfly spread.

If one wants to speculate on high volatility, one should use a straddle or a strangle.

Straddle.



the payoff function:

$$v(s) = |s-K| = \underbrace{(s-K)_+}_{v_c(s)} + \underbrace{(K-s)_+}_{v_p(s)}$$

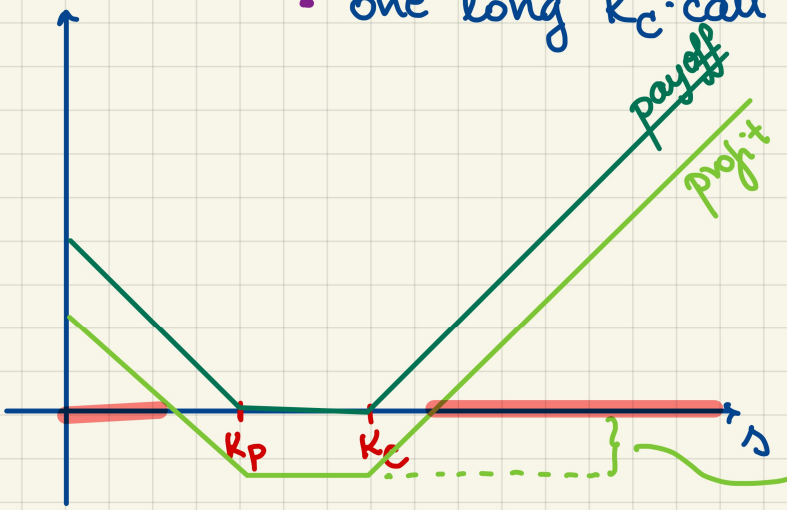
construction:

- one long K-call
- one long K-put

Strangle.

$K_p < K_c$

- one long K_p-put
- one long K_c-call



Task: Convince yourselves that for $K_p < K < K_c$ the straddle is, indeed, more expensive than the strangle!

7.

A non-dividend paying stock currently sells for 100. One year from now the stock sells for 110. The continuously compounded risk-free interest rate is 6%. A trader purchases the stock in the following manner:

- The trader pays 100 today
- The trader takes possession of the stock in one year

Determine which of the following describes this arrangement.

(A) Outright purchase
(B) Fully leveraged purchase
(C) Prepaid forward contract
(D) Forward contract
(E) This arrangement is not possible due to arbitrage opportunities

8.

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.

$K = S(0)$

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

X (A) Buy a strangle long K_P put and long K_C call w/ $K_P < K_C$
(B) Buy a straddle
X (C) Sell a straddle low volatility
X (D) Buy a butterfly spread low volatility
X (E) Sell a butterfly spread has three different strikes

16.

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.

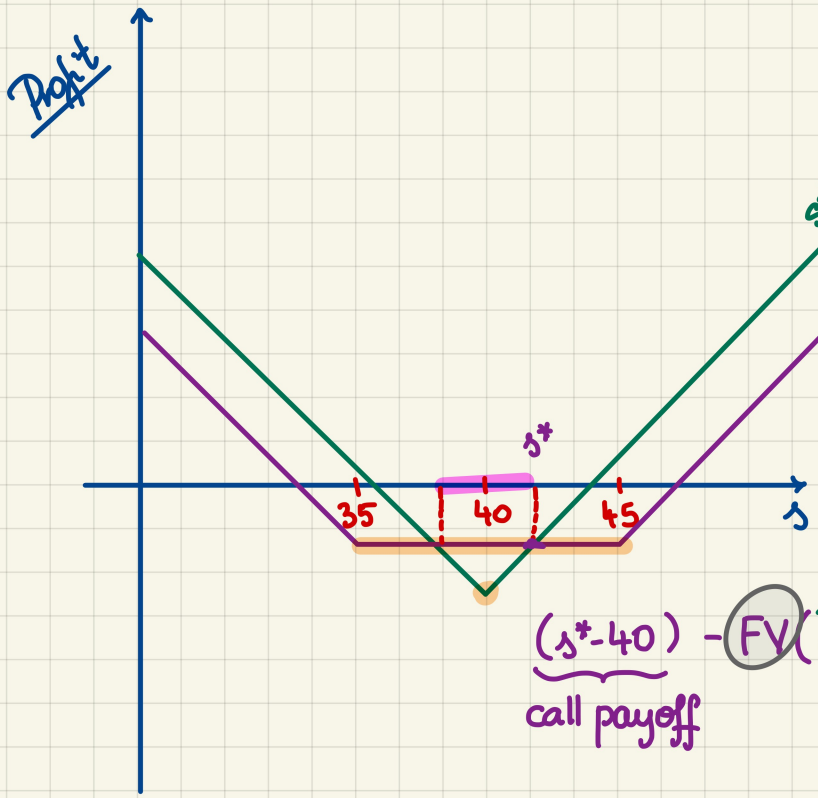
(A) The strangle never outperforms the straddle.

(B) $33.56 < S_T < 46.44$

(C) $35.13 < S_T < 44.87$

(D) $36.57 < S_T < 43.43$

(E) The strangle always outperforms the straddle.



$$\underbrace{(S^*-40)}_{\text{call payoff}} - FV(\overbrace{\text{Init. cost of straddle}}^{4.77}) =$$

$$= -FV(\underbrace{\text{Init. cost of strangle}}_{1.41})$$

$$S^* = 40 + FV(\overbrace{4.77-1.41}^{3.36}) = 40 + 3.36\,e^{0.08(0.25)}$$

$$S^* = 43.43$$

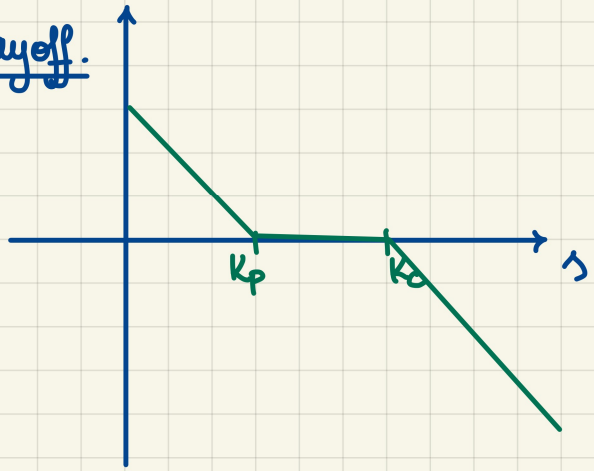
Collars [cont'd].

Let $K_P \leq K_C$

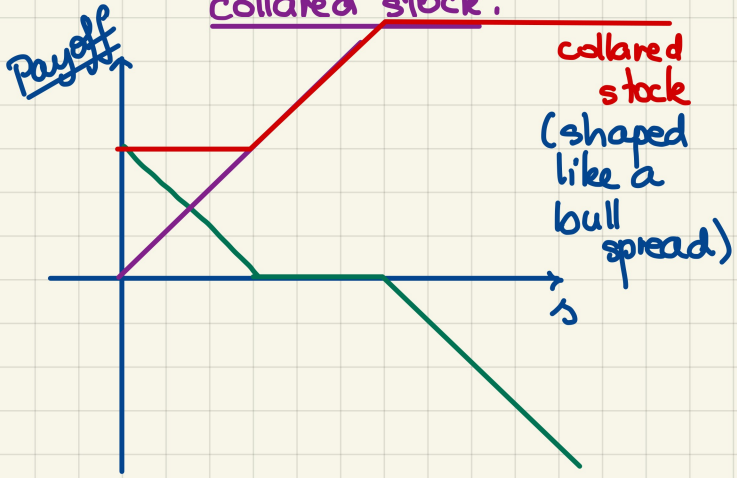
- Long the K_P-put
- Write the K_C-call

} both European & otherwise identical.

Payoff.



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

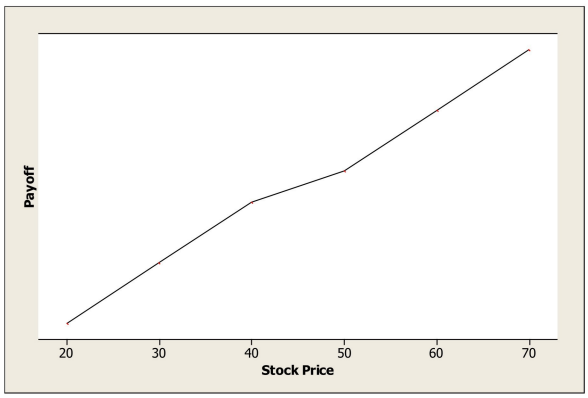


59.

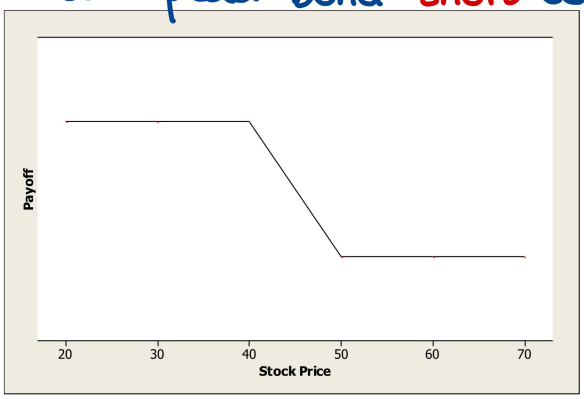
An investor has a long position in a non-dividend-paying stock, and additionally, has a long collar on this stock consisting of a 40-strike put and 50-strike call.

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

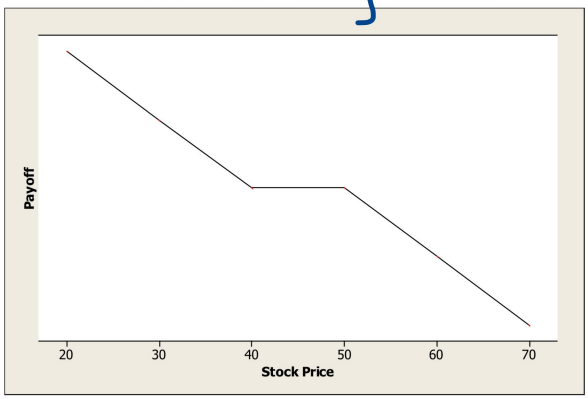
(A)



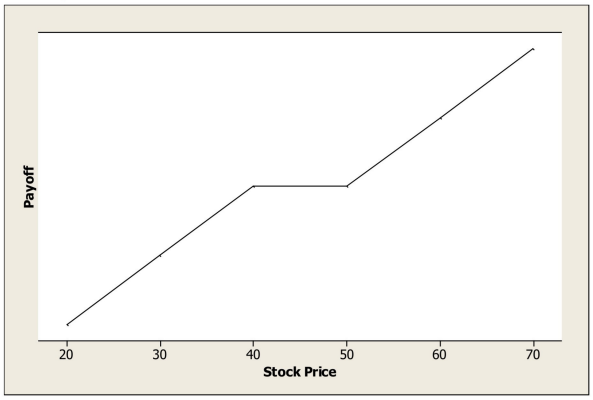
(B) bear spread + bond = short collared stock



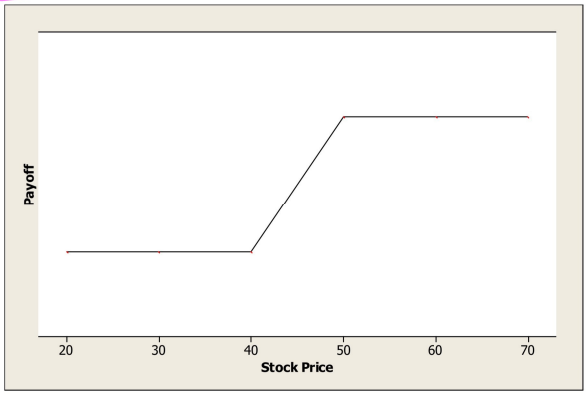
(C) "naked" long collar



(D) "naked" short collar



(E)



60.