HW 8.4 (c) Key

1. The table below contains information on four European options on Stock C.

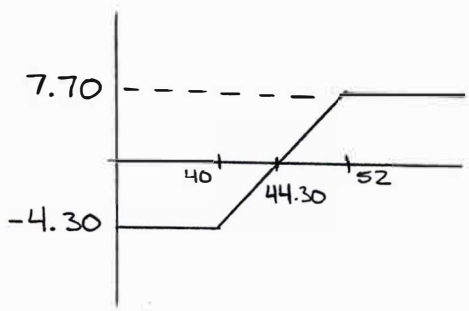
Option Type	Strike Price	Time to Maturity
Call	40	1 year
Call	52	1 year
Put	42	1 year
Put	51	1 year

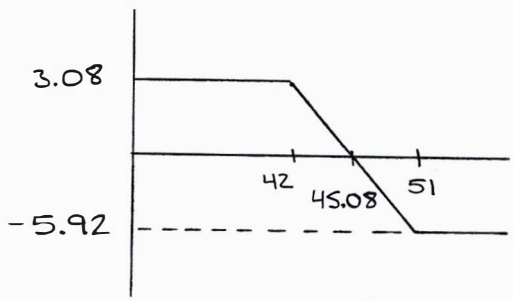
Colin creates a 40-52 bull spread using call options. He breaks even on his position if the price of Stock C at expiration is 44.30.

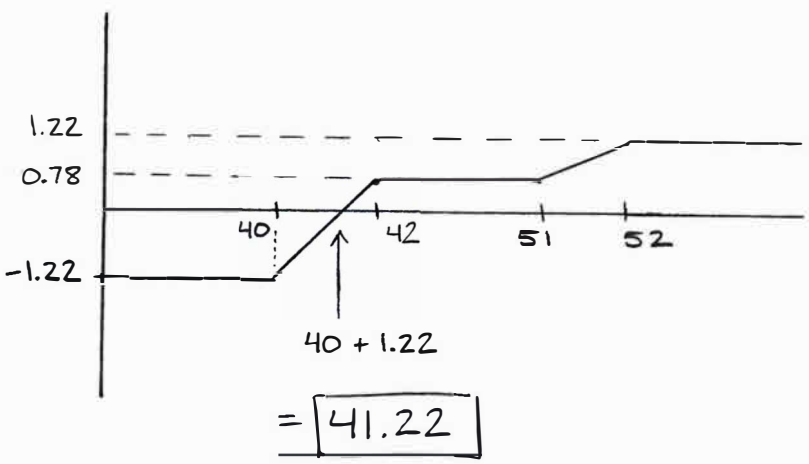
Dennis creates a 42-51 bear spread using put options. He breaks even on his position if the price of Stock C at expiration is 45.08.

Suppose Colin's position and Dennis's positions are combined. What is the price of Stock C at the end of the year such that one would break even on this combined position? [16-A4]

[A] 41.22 B) 41.78 C) 49.78 D) 49.22 E) 43.22







= 41.22

2. The following premiums are for one-year European options for an underlying asset with a current spot price of $50:

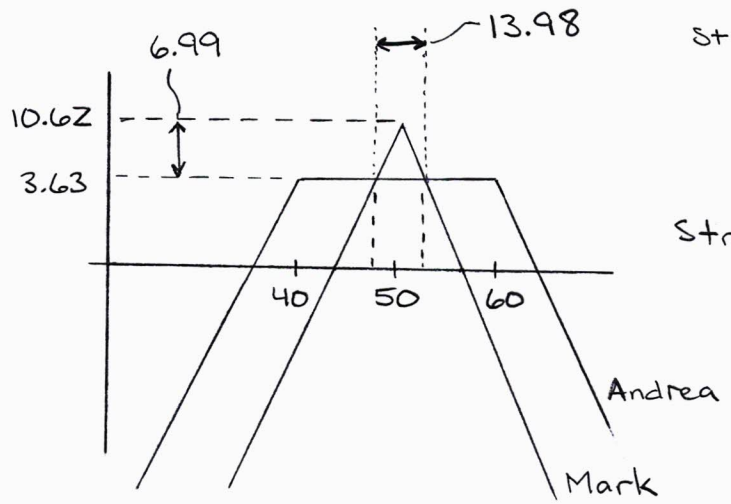
Strike Price	Call	Put
40	13.18	0.66
50	6.55	3.40
60	2.74	8.96

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

Mark writes a straddle using at the money options.
Andrea writes a 40-60 strangle.

Find the range of spot prices at expiration for which Andrea's profit is greater than Mark's profit. [16 - 84]

A) Between 43.01 and 56.99
B) Between 43.36 and 56.64
C) Between 43.71 and 56.29
D) Less than 43.01 or greater than 56.99
E) Less than 43.36 or greater than 56.64



Straddle: Prem = 6.55 + 3.40 = 9.95

$FV(Prem) = 9.95e^{0.065} = 10.62$

Strangle: Prem = 0.66 + 2.74 = 3.40

$FV(Prem) = 3.40e^{0.065} = 3.63$

Answer: $(50 - 6.99, 50 + 6.99) = \boxed{(43.01, 56.99)}$

3. The following premiums are for one-year European options for an underlying asset with a current spot price of \$90:

Strike Price	Call	Put
80	16.46	3.32
90	10.65	7.12
100	6.53	12.61

The continuously compounded risk-free annual rate of interest is 4%.

Seth writes a straddle using at the money options.
Josh purchases a symmetric butterfly spread using the options above.

Find the range of spot prices at expiration for which Seth's profit is greater than Josh's profit. [16-B5]

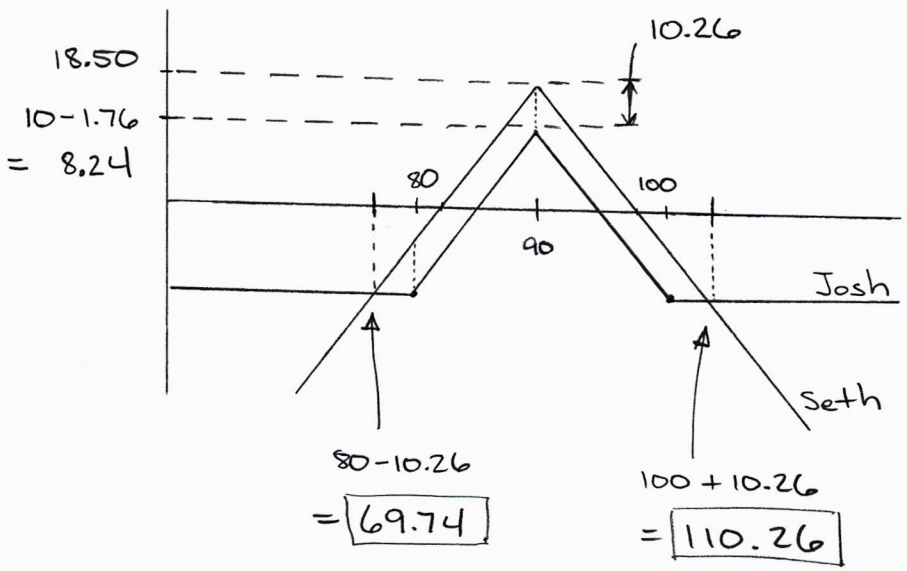
A) Between 69.75 and 110.25
B) Between 70.76 and 109.24
C) Between 71.77 and 108.23
D) Less than 69.75 or greater than 110.25
E) Less than 70.76 or greater than 109.24

Straddle: $\text{Prem} = 10.65 + 7.12 = 17.77$

$FV(\text{Prem}) = 17.77\, e^{0.04} = 18.50$

Butterfly: $\text{Prem} = -16.46 + 2(10.65) - 6.53 = -1.69$

$FV(\text{Prem}) = -1.69\, e^{0.04} = -1.76$



4. The following premiums are for one-year European options for an underlying asset with a current spot price of \$90:

Strike Price	Call	Put
80	16.99	3.09
90	11.10	6.71
100	6.87	11.99

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

Holly purchases a 80-100 bull spread.
Laura purchases a 80-100 strangle.

Find the range of spot prices at expiration for which Holly's profit is greater than Laura's profit. [16-B6]

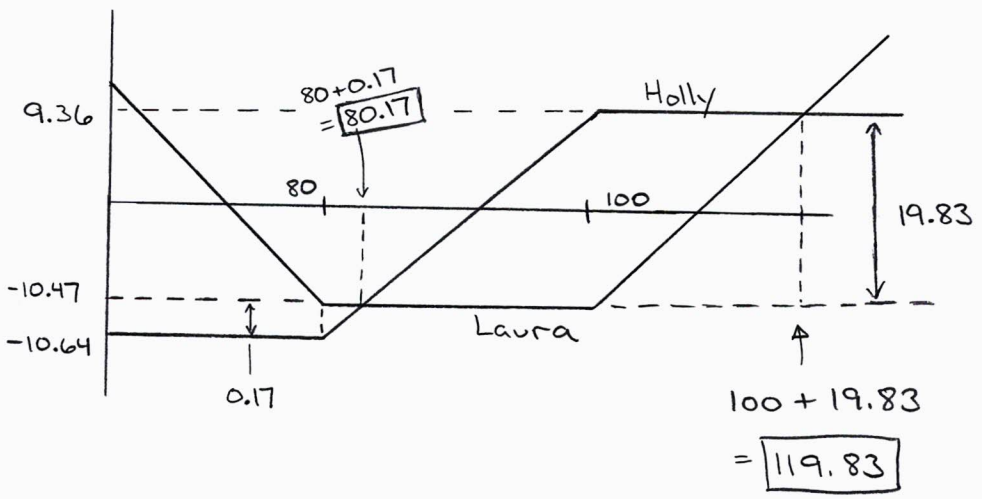
A) Between 80.17 and 119.83
B) Between 80.17 and 99.83
C) Between 89.83 and 100.17
D) Between 99.83 and 119.83
E) Between 99.83 and 99.83

Bull Spread: $\text{Prem} = 16.99 - 6.87 = 10.12$

$FV(\text{Prem}) = 10.12\,e^{0.05} = 10.64$

Strangle: $\text{Prem} = 3.09 + 6.87 = 9.96$

$FV(\text{Prem}) = 9.96\,e^{0.05} = 10.47$



5. The following premiums are for one-year European options for an underlying asset with a current spot price of \$80:

Strike Price	Call	Put
70	16.84	2.11
80	10.69	5.28
90	6.34	10.26

The continuously compounded risk-free annual rate of interest is 7%.

Gwen writes a 70-strike call option.
Mary purchases a 70-90 bear spread.

Find the range of spot prices at expiration for which Gwen's profit is greater than Mary's profit. [16-B7]

96.80

A) Less than ~~98.10~~
B) Less than 75.58
C) Greater than 98.10
D) Greater than 75.58
E) Between 75.58 and 98.10

Call : $FV(Prem) = 16.84e^{0.07} = 18.06$

Bear : $Prem = 16.84 - 6.34 = 10.50$

$FV(Prem) = 10.50e^{0.07} = 11.26$