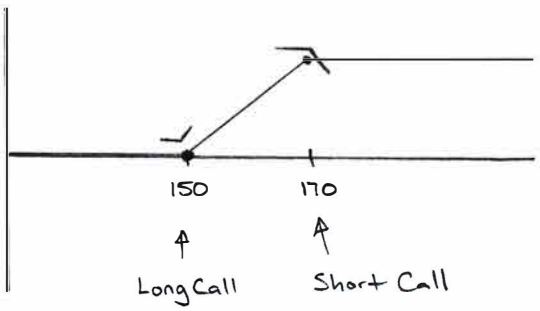
# HW 8.4 (a) Key

1. The following premiums are for one-year European options for an underlying asset with a current spot price of $150:

| Strike Price | Call | Put |
|---|---|---|
| 130 | 32.29 | 6.57 |
| 140 | 26.20 | 10.04 |
| 150 | 20.99 | 14.39 |
| 160 | 16.62 | 19.58 |
| 170 | 13.03 | 25.55 |

The continuously compounded risk-free annual rate of interest is 4.5%.
Find the cost of a 150-170 bull spread constructed using call options. [16 #03]

**A)** 7.96 B) –11.16 C) 8.33 D) –7.96 E) 11.16




Cost = 20.99 − 13.03

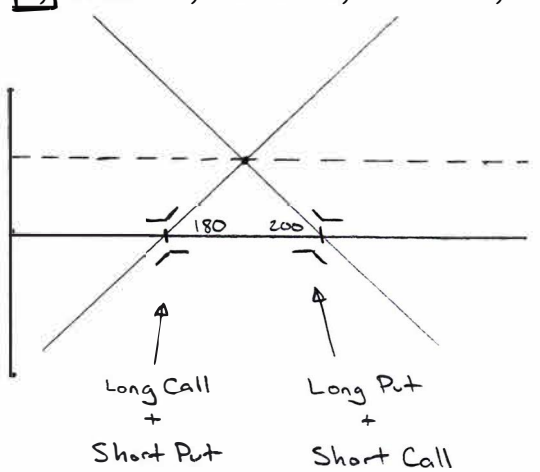
= **7.96**

2. The following premiums are for one-year European options for an underlying asset with a current spot price of $180:

| Strike Price | Call | Put |
|---|---|---|
| 160 | 35.70 | 9.43 |
| 170 | 29.86 | 13.19 |
| 180 | 24.76 | 17.70 |
| 190 | 20.36 | 22.91 |
| 200 | 16.63 | 28.79 |

The continuously compounded risk-free annual rate of interest is 4%.
Find the cost of a 180-200 box spread. [16 #04]

**A)** 19.22 B) –5.10 C) 20.00 D) –19.22 E) 5.10




Cost = 24.76 − 17.70 + 28.79 − 16.63

= **19.22**

Note: PO of Spread is always 20

So, Cost = PV(20)

$= 20e^{-0.04} = 19.22$

3. The following premiums are for one-year European options for an underlying asset with a current spot price of $150:

| Strike Price | Call | Put |
|---|---|---|
| 130 | 31.87 | 6.77 |
| 140 | 25.80 | 10.31 |
| 150 | 20.63 | 14.75 |
| 160 | 16.30 | 20.03 |
| 170 | 12.75 | 26.08 |

The continuously compounded risk-free annual rate of interest is 4%.
You construct a ratio spread using only 150, 160, and 170 strike call options.

The payoff for your spread is given below for several spot prices at expiration :

| Spot Price | Total Payoff |
|---|---|
| 160 | 20 |
| 170 | 20 |
| 180 | 50 |

Find the cost of your ratio spread. [16 #05]

[A] 46.91 B) 39.87 C) 42.22 D) 44.56 E) 49.26

PO per unit of Call:

| | (x) | (y) | (z) |
|---|---|---|---|
| $S_T$ | K=150 | K=160 | K=170 |
| 160 | 10 | 0 | 0 |
| 170 | 20 | 10 | 0 |
| 180 | 30 | 20 | 10 |

Let: x = # of K=150 Calls
y = # of K=160 Calls
z = # of K=170 Calls

$$10x = 20 \rightarrow x = 2$$
$$20x + 10y = 20 \rightarrow y = -2$$
$$30x + 20y + 10z = 50 \rightarrow z = 3$$

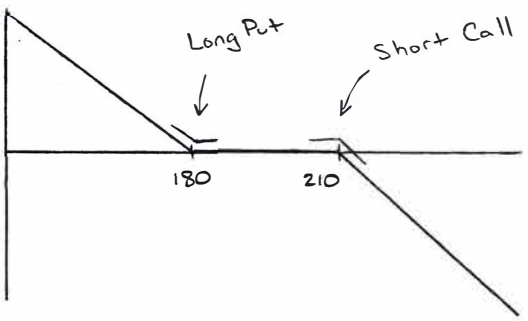
$$\text{Cost} = 2(20.63) - 2(16.30) + 3(12.75) = \boxed{46.91}$$

4. The following premiums are for one-year European options for an underlying asset with a current spot price of $200:

| Strike Price | Call | Put |
|---|---|---|
| 180 | 42.74 | 8.90 |
| 190 | 36.77 | 12.16 |
| 200 | 31.42 | 16.04 |
| 210 | 26.68 | 20.53 |
| 220 | 22.52 | 25.61 |

The continuously compounded risk-free annual rate of interest is 8%.
Find the cost of a 180-210 collar. [16 #06]

**A)** –17.78 B) 22.21 C) –19.26 D) 17.78 E) –22.21




Cost = 8.90 - 26.68

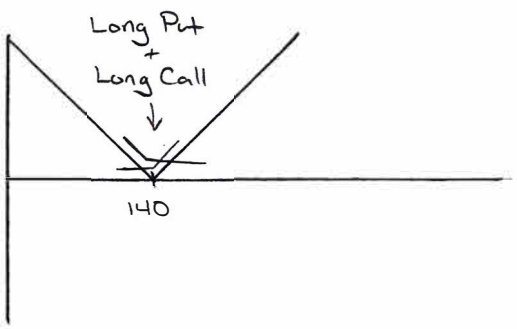
= **-17.78**

5. The following premiums are for one-year European options for an underlying asset with a current spot price of $140:

| Strike Price | Call | Put |
|---|---|---|
| 120 | 30.62 | 5.91 |
| 130 | 24.46 | 9.36 |
| 140 | 19.25 | 13.76 |
| 150 | 14.96 | 19.08 |
| 160 | 11.49 | 25.22 |

The continuously compounded risk-free annual rate of interest is 4%.
Find the cost of a straddle constructed using at-the-money options. [16 #07]

**A)** 33.01 B) 5.49 C) 34.36 D) –33.01 E) –5.49




Cost = 19.25 + 13.76

= **33.01**