HW 8.1 (b) Key

1. . Suppose a speculator believes that the price of oil, currently at $110 per barrel, will increase slightly, but not significantly, during the upcoming year. She therefore makes the following two transactions:

   1) She purchases a 12-month call option, with an exercise price of $110 per barrel, on 1,000 barrels of oil. The premium for this option is $2400.
   2) She writes a 12-month call option, with an exercise price of $115 per barrel, on 1,000 barrels of oil. The premium for this option is $800.

   The price of oil at the time of the common expiration of these two options is $117.5 per barrel. The annual continuously compounded interest rate is 4.5%. Find the profit or loss, at the expiration date of the two options, on the speculator's combined-option portfolio. [12 #11]

   A) $3326 Profit   B) $6674 Profit   C) $11,674 Loss   D) $8326 Profit   E) $6674 Loss

Long Call : $FV(Prem) = 2.4 e^{0.045} = 2.51047$ (per barrel)

Short Call : $FV(Prem) = 0.8 e^{0.045} = 0.83682$ (per barrel)
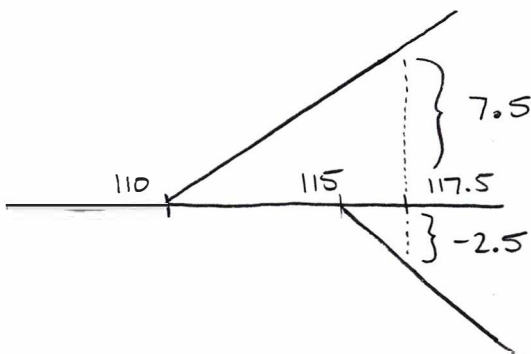
$Profit = 0.83682 - 2.51047 + 7.5 - 2.5$

$= 3.32635$

$\boxed{3326}$

2. The following six-month call options on XYZ Corp. stock, which currently has a price of $57 per share, are available in the market:

Option	Exercise Price (per share)	Premium	FV (Prem)	PO (per Call)	Quantity
A	55	6.54	6.7056	7.5	1
B	60	4.16	4.2653	2.5	2
C	65	2.51	2.5735	0	3

Each of these options is on one share of XYZ Corp. stock, and they all have a common exercise date. The annual continuously compounded interest rate is 5%. $\rightarrow \delta = 0.05$

Suppose you decide to purchase one Option A, two Option Bs, and three Option Cs. Six months later, on the expiration date of the options, the per-share price of XYZ Corp. stock is $62.5. Your profit or loss, on the option expiration date, on your investment is P. Find P. [12 #12]

A) $10.46 Loss   B) $35.46 Profit   C) $17.96 Loss   D) $2.96 Loss   E) $27.96 Profit

$$P = 7.5 + 2(2.5) - \left[6.7056 + 2(4.2653) + 3(2.5735) \right]$$

$$= \boxed{-10.4567}$$

2. The current price of a stock is $82. Jason makes the following transactions:

* Purchase one 80-strike European call option with a premium of $13.08.
* Write two 85-strike European call options with a premium of $10.67.
* Purchase three 90-strike European call options with a premium of $8.62.
* Write three 95-strike European call options with a premium of $6.91.
* Purchase one 100-strike European call option with a premium of $5.50

All options above have the same underlying stock and have 1 year until expiration.
The continuously compounded risk-free interest rate is 6%.

Calculate the maximum profit that Jason can obtain from this strategy. [12-61]

A) $7.48   B) $2.52   C) $2.48   D) $10.00   E) $12.52

		80	85	90	95	100
Payoffs:	K = 80, ×1, Long	—	5	10	15	20
	K = 85, ×2, Short	—	—	-10	-20	-30
	K = 90, ×3, Long	—	—	—	15	30
	K = 95, ×3, Short	—	—	—	—	-15
	K = 100, ×1, Long	—	—	—	—	—
		0	5	0	10	5

(S_T) column header above 80 85 90 95 100, with 95 and 10 circled.

$$FV(Prem) = \left[-13.08 + 2(10.67) - 3(8.62) + 3(6.91) - 5.50 \right] e^{0.06} = -2.5166$$

$$Max\ Profit = 10 - 2.5166 = \boxed{7.48}$$

4. The spot price of a certain stock is currently $55.
   Grant purchases a one-year 60-strike European call on the stock for a premium of $5.47.
   Heidi writes a one-year 70-strike European call on the same stock for a premium of $2.72.
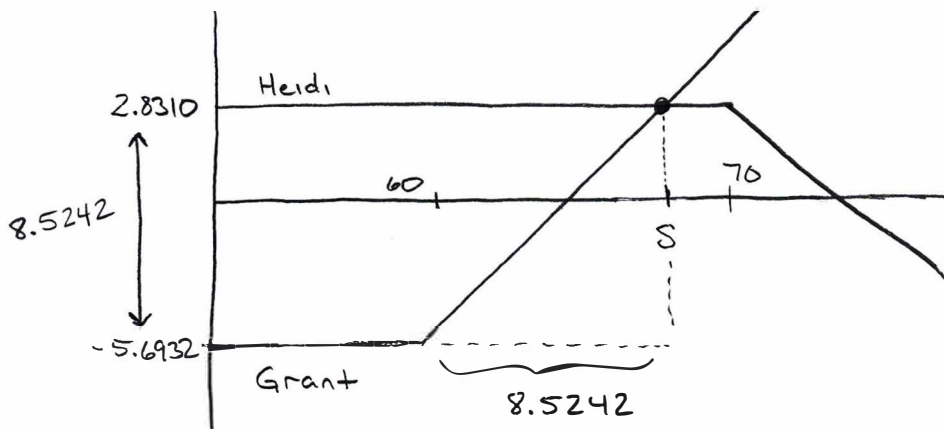   The risk-free interest rate is 4%, compounded continuously.
   At a spot price of S at expiration, Grant's profit is equal to Heidi's profit.
   Find S. [12-62]   ↳ $\delta = 0.04$

   A) $68.52   B) $73.52   C) $78.52   D) $83.52   E) $62.83

$$S = 60 + 8.5242 = \boxed{68.5242}$$

5. The spot price of a certain stock is currently $95.
   Lori purchases a one-year 100-strike European call on the stock for a premium of $12.56.
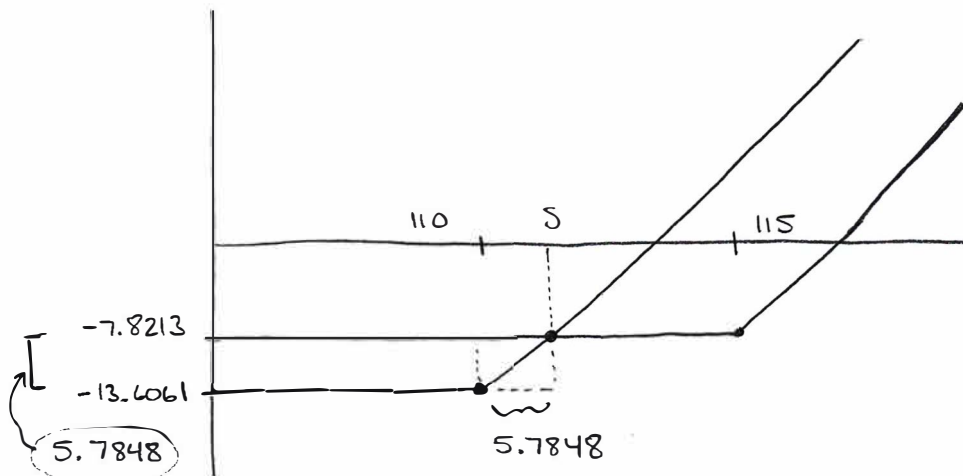   Chad purchases a one-year 115-strike European call on the same stock for a premium of $7.22.
   The risk-free interest rate is 8%, compounded continuously.
   At a spot price of S at expiration, Lori's profit is equal to Chad's profit.
   Find S. [12-63]   ↳ $\delta = 0.08$

   A) $105.78   B) $110.78   C) $120.78   D) $125.78   E) $92.18

$$S = 110 + 5.7848 = \boxed{115.7848}$$