HW 8.2 (b) Key

1. Suppose that the price of a stock is currently $125 per share. You have a portfolio of four long put options on the stock:

   * One long put with an exercise price of $120.
   * Two long puts with an exercise price of $125.
   * One long put with an exercise price of $130.

   The price of the stock at the time of the common expiration of these options is X per share. The payoff from the portfolio is $28. Find X. [13 #11]

   [A)] $118   B) $119   C) $122   D) $121   E) $123
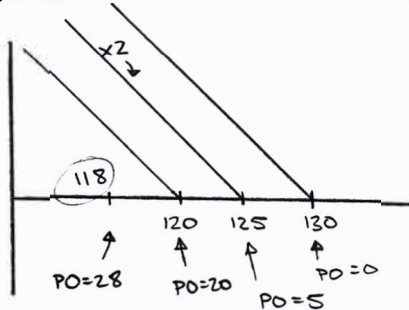
2. The spot price of a certain stock is currently $70.
   Tim writes a one-year 60-strike European put on the stock for a premium of $2.70.
   Lars purchases a one-year 80-strike European put on the same stock for a premium of $11.84.
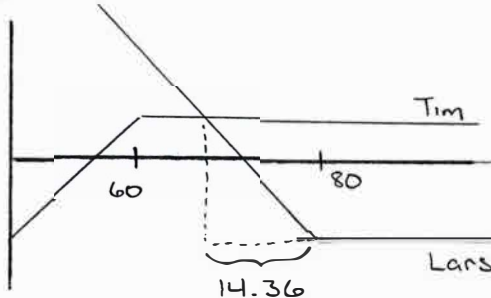   The risk-free interest rate is 5.5%, compounded continuously.
   At a spot price of S at expiration, Tim's profit is equal to Lars's profit.
   Find S.

   $2.70\,e^{0.055} = 2.85$

   $11.84\,e^{0.055} = 12.51$

   [A)] $64.64   B) $89.66   C) $70.34   D) $95.36   E) $75.36

   $80 - 14.36 = \boxed{64.64}$

3. The spot price of a certain stock is currently $80.
   Lucille purchases a one-year 75-strike European call on the stock for a premium of $14.00.
   George purchases a one-year 85-strike European put on the same stock for a premium of $10.02.
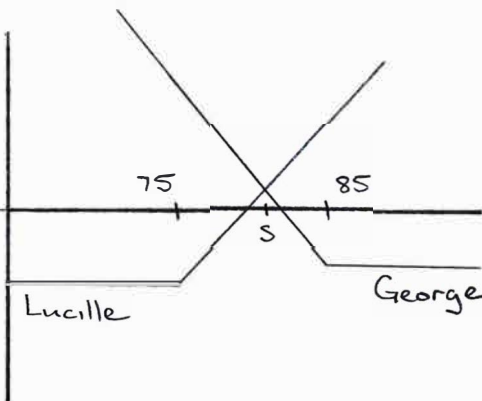   The risk-free interest rate is 5%, compounded continuously.
   At a spot price of S at expiration, Lucille's profit is equal to George's profit.
   Find S.

   $14\,e^{0.05} = 14.72$

   $10.02\,e^{0.05} = 10.53$

   [A)] $82.09   B) $92.63   C) $77.91   D) $70.82   E) $89.18

   $S - 75 - 14.72 = 85 - S - 10.53$

   $S = \boxed{82.10}$

4. The spot price of a certain stock is currently $90.
   Anna writes a one-year 85-strike European put on the stock for a premium of $6.77.
   Joan writes a one-year 100-strike European call on the same stock for a premium of $8.14.
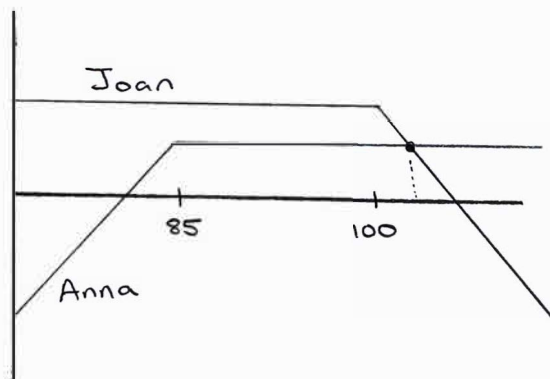   The risk-free interest rate is 3.5%, compounded continuously.
   At a spot price of S at expiration, Anna's profit is equal to Joan's profit.
   Find S.

   $6.77 e^{0.035} = 7.01$

   $8.14 e^{0.035} = 8.43$

   A) $101.42   B) $98.58   C) $86.42   D) $83.58   E) $115.44

   $8.43 + 100 - S = 7.01$

   $S = \boxed{101.42}$

5. The current price of a stock is $62. Emma makes the following transactions:

   * Write one 60-strike European put option with a premium of $4.65.
   * Write three 65-strike European put options with a premium of $6.96.
   * Purchase two 70-strike European put options with a premium of $9.75.
   * Purchase one 75-strike European call option with a premium of $4.32.
   * Write two 80-strike European call options with a premium of $3.17.

   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 Emma can obtain from this strategy.

   A) $18.55   B) $13.55   C) $1.45   D) $-3.55   E) $23.55

Payoffs :

Option	K	#	S_T 60	65	70	75	80
Short Put	60	×1	—	—	—	—	—
Short Put	65	×3	-15	—	—	—	—
Long Put	70	×2	20	10	—	—	—
Long Call	75	×1	—	—	—	—	5
Short Call	80	×2	—	—	—	—	—
			5	⑩	0	0	5

$FV(Prem) = [4.65 + 3(6.96) - 2(9.75) - 1(4.32) + 2(3.17)] e^{0.06} = 8.55$

Max Profit = 10 + 8.55 = $\boxed{18.55}$