

Section 8 problems: (draft)

1. Gold futures are traded through 100 ounce contracts. At the end of trading on December 15, 2008, an investor takes a long position on one gold futures contract that has a June 2009 delivery. Per contract, the initial margin (deposit) is \$5000 and the maintenance margin is \$3000. Mark to market is performed monthly and interest on the margin is credited at  $i^{(12)} = 12\%$ . You are given the following gold futures prices per ounce on monthly anniversary dates:

December 15, 2008 – 980.25; January 15, 2009 – 965.35;  
February 15, 2009 – 1020.55; March 15, 2009 – 950.60.

A margin call is made on March 15, 2009. Determine the minimum deposit necessary to keep the contract open.

2. Which of the following is short with respect to the underlying asset?  
A. Long Call   B. Long Put   C. Short Call   D. Short Put   E. Long Forward
3. A non-dividend paying stock currently sells for 50. The risk free interest rate is 3% compounded continuously. A 2-year 50-strike put is purchased for 4.40. Determine the payoff if the stock is selling for 54 after two years. Determine the profit in this case.
4. A non-dividend paying stock currently sells for 50. The risk free interest rate is 3% compounded continuously. A 2-year 50-strike put is purchased for 4.40. Determine the payoff if the stock is selling for 48 after two years. Determine the profit in this case.
5. A non-dividend paying stock currently sells for 50. The risk free interest rate is 3% compounded continuously. A 2-year 50-strike call is purchased for 7.31. Determine the payoff if the stock is selling for 54 after two years. Determine the profit in this case.
6. A non-dividend paying stock currently sells for 50. The risk free interest rate is 3% compounded continuously. A 2-year 50-strike call is purchased for 7.31. Determine the payoff if the stock is selling for 48 after two years. Determine the profit in this case.

1) margin interest rate = .01 = meir

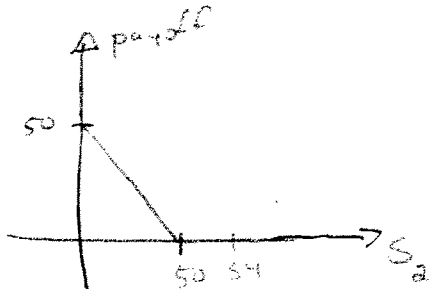
<u>Date</u>	<u>Price per ounce</u>	<u>(Notional) Contract Value</u>	<u>Margin Balance</u>
12/15/08	980.25	98025	5000
01/15/09	965.35	96535	$5000(1.01) + (96535 - 98025) = 3560$
02/15/09	1020.55	102055	$3560(1.01) + (102055 - 96535) = 9115.60$
03/15/09	950.60	95060	$9115.60(1.01) + (95060 - 102055) = 2211.76$

The margin balance of 2211.76 on 3/15/09 is below the maintenance margin of 3000, and so a margin call of  $5000 - 2211.76 = \underline{2788.24}$  is made.

2) long call  $\Rightarrow$  bought an option to buy the asset  
 $\therefore$  long call  $\Rightarrow$  long w.r.t. underlying asset  
 long put  $\Rightarrow$  bought an option to sell the asset  
 $\therefore$  long put  $\Rightarrow$  short w.r.t. underlying asset  
 short call is reverse of long call  
 $\Rightarrow$  short call is short w.r.t. underlying asset  
 Likewise, short put is long w.r.t. underlying asset  
 long forward  $\Rightarrow$  agreement to buy the asset  
 $\Rightarrow$  long forward is long w.r.t. underlying asset

Summary: long put and short call are each short positions w.r.t. the underlying asset,

3) long put (50)



$$\text{Initial Cost} = IC = 4.40$$

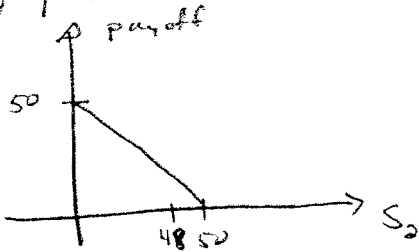
$$\text{Accumulated Value of Initial Cost} = AV_{IC} = 4.40 \cdot e^{.06} = 4.67$$

$$\text{profit} = \text{payoff} - AV_{IC}$$

$$\text{If } S_2 = 54, \text{ payoff} = 0$$

$$\text{profit} = -4.67$$

4) long put (50)



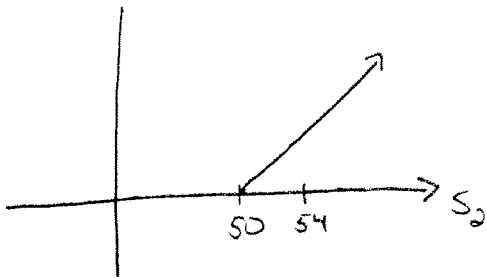
$$IC = 4.40$$

$$AV_{IC} = 4.40 e^{.06} = 4.67$$

$$\text{If } S_2 = 48, \text{ payoff} = 2$$

$$\text{profit} = 2 - 4.67 = -2.67$$

5) long call (50)



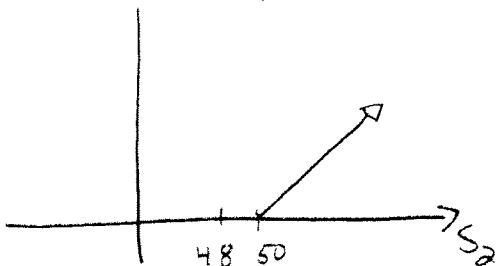
$$IC = 7.31$$

$$AV_{IC} = 7.31 e^{.06} = 7.76$$

$$\text{If } S_2 = 54, \text{ payoff} = 4$$

$$\text{profit} = 4 - 7.76 = -3.76$$

6) long call (50)



$$IC = 7.31$$

$$AV_{IC} = 7.31 e^{.06} = 7.76$$

$$\text{If } S_2 = 48, \text{ payoff} = 0$$

$$\text{profit} = -7.76$$