FIN 533 Fall 2008 Derivative Problems

1. Suppose you think that Wal-Mart stock is going to appreciate substantially in value in the next five months. Say the stock's current price is $55 and the call option expiring in 5 months has an exercise price of $55 and is selling at a price of $5. With $5,500 to invest, you are considering three alternatives:

a. Invest all $5,500 in stock, buying 100 shares
b. Invest all $5,500 in 1,100 options (11 contracts)
c. Buy 100 options (one contract) for $500 and invest the remaining $5,000 in a money market fund paying 1% in interest over 5 months (2.4% per year)

What is your rate of return for each alternative if the stock price is $40 five months from now? What if the price is $65 five months from now?

2. Consider the following options portfolio. You write an April expiration call option on IBM with exercise price of $90. You write an April expiration put option with exercise price of $80. The price of the April call option is $10 and the price of the April put option is $8.00. Graph the profit/loss diagram of this portfolio at option expiration as a function of IBM's stock price. To receive credit, you must consolidate the two option payoffs on one graph. Be sure to label maximum profits/losses and breakeven points.

3. You plan to buy one share of a stock that is currently selling for $50. You forecast that in one year, the stock's price will be either $70 or $30, with equal probabilities. There is a one-year call option on the stock, valued at $5.62, with an exercise price of $60. You are able to borrow at a rate of 9%. You would like to hedge your stock position using the call option. Assuming that you buy one share of stock, what position would you take in the option? (In other words, determine how many call options to buy or sell)

   Suppose that the call option is mispriced and is actually selling for $6.20. How could you combine the call options with one share of stock to make arbitrage profits? Fill in the entries in the table below to illustrate the cash flows and payoffs to this strategy.

		Cash Flow in One Year	
	Initial Cash Flow	S = $30	S = $70
Options market			
Stock Market			
Borrowing/Lending			
Total Cash flow			

4. Use the Black-Scholes formula to find the value of a call option on the following stock:

Time to expiration	365 days
Standard deviation	45% per year
Exercise price	$75
Stock price	$70
Interest rate	6%

5. You purchased a Soybean Oil futures contract today at the settlement price of $0.1529 per pound. A contract is for 60,000 lbs. There is a 10% margin requirement. Suppose the price of the futures contract changes as shown in the following table, enter the relevant information into the table. Show your calculations.

Day	Futures Price	Profit/Loss per lb.	Total Value of Contract	Mark-to-Market Settlement
0	$0.1529	n.a.		n.a.
1	$0.1527			
2	$0.1540			
3	$0.1597			

If you close out your position on day 3, what is your percentage return?