UNIST
School of Business Administration

FIA303: Futures and Options	Daejin Kim
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Assignment 1
Due Date : **Tuesday, November 13, 2018**

1. **(10 points)** Open interest represents the number of contracts outstanding at a particular point of time. The following table shows that daily trading volume by each trader. Assume that open interest at the beginning day 1 is 0. Compute the daily trading volume and end-of-day open interest that would be reported by the exchange.

Day	Buyer	Seller	# of contracts	Volume	Open interest
1	A	C	60		
	B	D	100		
	E	A	50		
2	A	D	10		
	C	B	50		
	C	B	50		
	A	C	20		
3	D	E	30		
	B	E	40		
	D	A	20		
4	D	B	40		
	C	E	30		

2. **(15 points)** The file, Open Interest.xlsx, contains the daily open interest figures for seven different futures contracts. The first two contracts have cash settlement, and the next five have delivery settlement. Find the maximum open interest of each contract, and then compute the ratio of the open interest on the last business day in the month before the delivery month to the maximum open interest during the contract's life. Is there a meaningful difference between the ratios for the different styles of settlement, and why?

3. **(25 points)** Derivatives exchanges use a system of margins to help ensure that buyers and sellers of futures and options honor the terms of their trades. Margins are two types - *initial margin* and *maintenance margin*. The initial margin is the per contract amount deposited when you open a position. If the balance in your account at the end of the day falls below a level called the *maintenance margin*, you will receive a *margin call* and will be required to bring the total amount of the margin back up to the initial margin level. At of September 15, 2014, the Korea Exchange(KRX) had the following initial and maintenance margin rates in place:

Product	Contract Size	Initial Margin Rate	Maintenance Margin Rate
KOSPI200 futures	KRW 500,000	10.50%	7.00 %
3-year KTB futures	KRW 100 million	0.75 %	0.50 %
USD futures	USD 10,000	3.90 %	2.60%
Mini Gold futures	100g	9.00 %	6.00%
SSF (Daewoo Securities)	10 shares	10.50%	7.00 %
SSF (Samsung Securities)	10 shares	11.25%	7.50 %
SSF (Mirae Asset Securities)	10 shares	18.75%	12.50 %

(a) **(5 points)** Given the settlement prices in the following table, calculate the initial margin and maintenance margin level for each contract. Assume you buy 10 contracts.

Product	Maturity	Price
KOSPI200 futures	2014-Dec	264.6
3-year KTB futures	2014-Dec	107.29
USD futures	2014-Dec	1,045.9
Mini Gold futures	2014-Oct	41,090
SSF (Daewoo Securities)	2014-Dec	11,950
SSF (Samsung Securities)	2014-Dec	48,550
SSF (Mirae Asset Securities)	2014-Dec	47,900

(b) **(10 points)** Assume that you <u>bought</u> 15 US Dollar futures contracts on March 27, 2014 at a price of 1083.50. US Dollar futures listed on the KRX exchange has the denomination factor of $ 10,000. The initial margin rate is 3.90% and the maintenance margin rate is 2.60%. Show how the balance in your trading account evolves on a day-by-day basis, given the daily settlement prices in **USD futures.xls**.

(c) **(10 points)** Assume that you <u>sold</u> 15 US Dollar futures contracts on March 27, 2014 at a price of 1083.50. Show how the balance in your trading account evolves on a day-by-day basis, given the daily settlement prices in **USD futures.xls**.

4. **(30 points)** Suppose that you go to your local bank and tell the manager that you want to borrow $10,000 in three months and want to repay the loan with a single payment nine month later. Because you believe interest will rise over the next three months, you further request that the interest be lock-in the interest rate because he has no idea what it will be in three months. You then ask about the current borrowing and lending rates at the bank, and he gives you the following table.

Term	Lending Rate	Borrowing Rate
3 months	3.00 %	3.50 %
6 months	3.50 %	4.00 %
9 months	4.00 %	4.50 %
1 year	4.50 %	5.00 %

(a) **(10 points)** Based on these quoted rates, what forward rate can you lock in today on a nine-month loan beginning in three months?

(b) **(20 points)** Now you wish to create a synthetic forward rate agreement in which you would lock in a return between 3 months and 1 year. What are the transactions used to create this instrument? Show how to construct this instrument step by step. What rate can lock in today from this instrument?

5. **(15 points)** Suppose that you want to short sell 500 shares of ABC company over the next 90 days. Its current share price is $ 78 and a $ 2.4 cash dividend will be paid in next 25 days.

(a) **(5 points)** What will be the value of your short position in 90 days, assuming risk-free rate is 3%. Assume that the share price in 90 days is $ 72.

(b) **(10 points)** Short-selling by individuals is very costly. However, suppose that there is a individual stock futures listed on the exchange. Assume that in place of short selling ABC's shares, you are able to sell 90-day futures on ABC shares. Prove that in 90 days will be the same as in part (a) assuming no costless arbitrage opportunities are available in the market place.