

PGDM, 2016-18
Derivatives and Risk Management
DM-413/IB-408
Trimester ~~III~~ End-Term Examination: September 2017

Time allowed: 2 Hrs 30 Min

Max Marks: 50

Roll No: _____

Instruction: Students are required to write Roll No on every page of the question paper, writing anything except the Roll No will be treated as **Unfair Means**. All other instructions on the reverse of Admit Card should be followed meticulously. Please carry a non-programmable calculator.

Section: A (15 Marks).

Attempt 3 out of 5 questions, each question carries 5 marks.

1. Derivatives may be used for both hedging and insurance. What is the difference in these two motives?
2. What is the "closing out" of a position in futures markets? Why is closing out of contracts permitted in futures markets? Why is unilateral transfer or sale of the contract typically not allowed in forward markets?
3. Keeping all other parameters the same, if the dividend rate on the stock increases, which option depreciates less, the American call or the European call? Why?
4. The forward price of wheat for delivery in three months is \$3.90 per bushel, while the spot price is \$3.60. The three-month interest rate in continuously compounded terms is 8% per annum. Is there an arbitrage opportunity in this market if wheat may be stored costlessly?
5. What is the sign of the delta of (a) a call and (b) a put? If the delta of a European call is 0.6, what is the delta of the European put for the same strike and maturity?

Sec B

(Answer any two questions out of five. Each question carries ten marks)

6. The initial stock price is \$100. The stock moves up each period by a factor of 1.3 and down by a factor of 0.8. If the simple interest rate per period is 1%, what is the risk-neutral probability of an up move in the stock price?
Draw the stock price tree for three periods and price an European call option for three periods at strike \$105.
7. a) Microsoft is currently trading at \$26. You expect that prices will increase but not rise above \$28 per share. Options on Microsoft with strikes of \$22.50, \$25.00, \$27.50, and \$30 are available. What options portfolio would you construct from these options to incorporate your views?

b) Suppose your view in the previous question were instead that Microsoft's shares will fall but a fall below \$22 is unlikely. Now what strategy will you use?

c) Compute the gross payoffs for the following two portfolios in separate tables:

- Calls (strikes in parentheses): $C(90) - 2C(100) + C(110)$.
- Puts (strikes in parentheses): $P(90) - 2P(100) + P(110)$.

What is the relationship between the two portfolios? Can you explain why? (4+3+3)

8. a) Explain intuitively why the delta of a call will lie between zero and unity. When will it be close to zero? When will it be close to unity?

b) Give an example of a derivative where the delta may be either positive or negative for different ranges of the stock price. (Use your imagination here.) (5+5)

**Sec C
(15 marks)**

9. It is now October 2014. A company anticipates that it will purchase 1 million pounds of copper in each of February 2015, August 2015, February 2016, and August 2016. The company has decided to use the futures contracts traded in the COMEX division of the CME group to hedge its risk. One contract is for the delivery of 25000 pounds of copper. The initial margin is \$2000 per contract and the maintenance margin is \$1500 per contract. The company's policy is to hedge 80% of its exposure. Contracts with maturities up to 13 months into the future are considered to have sufficient liquidity to meet the company's needs.

Assume the market prices (in cents per pound) today and at future dates are as in the following table:

Date	Oct 2014	Feb 2015	Aug 2015	Feb 2016	Aug 2016
Spot Price	372.00	369.00	365.00	377.00	388.00
Mar 2014 futures prices	372.80	369.10			
Sept 2014 futures prices	372.80	370.20	364.80		
Mar 2015 futures prices		370.70	364.30	376.70	
Sept 2015 futures prices			364.20	376.50	388.20

- i) Devise a hedging strategy for the company.
- ii) What is the impact of the strategy you propose on the price the company pays for copper?
- iii) What is the initial margin requirement in October 2014?
- iv) Is the company subject to any margin calls? (6+3+3+3)