Finance 436 – Futures and Options  
Review Notes for Final Exam

Chapter 9

1. Options: call options vs. put options, American options vs. European options
2. Characteristics: option premium, option type, underlying asset, expiration date, striking price
3. Options positions and profit/loss diagrams (4 positions)
4. Option premium, intrinsic value, and time value: concepts and calculations
5. Out-of-the-money, in-the-money, and at-the-money options
6. Option payoffs at maturity
7. Margin requirements in naked option writing: concepts and calculations
8. Examples discussed in class and homework problems

Chapter 10

1. Six factors that affect option prices: concepts
2. Upper and lower bounds for option prices: concepts and applications
   Upper bounds for call options: $c \leq S$ and $C \leq S$
   Upper bounds for put options: $p \leq K$ and $P \leq K$
   Lower bounds for European call options (no dividend): $c \geq S - K e^{-rT}$
   Lower bounds for European put options (no dividend): $p \geq K e^{-rT} - S$
   If the conditions are violated, arbitrage opportunity exists (how?)
3. Put-call parity: concepts and calculations (how to arbitrage if the parity is violated?)
   \[ c + Ke^{-rT} = p + S_0 \]
4. Early exercise: never early exercise calls on nondividend-paying stocks
   Why? Time value and insurance
5. Early exercise: if the put option is deep in the money
6. Effect of dividends: sometimes it is optional to exercise an American call option immediately prior to an ex-dividend date
7. Examples discussed in class and homework problems

Chapter 11

1. Combinations of a single option and a stock: concepts and calculations
   Long a stock + buy a put = buy a call (protective put)
   Short a stock + write a put = write a call
   Short a stock + buy a call = buy a put
   Long a stock + write a call = write a put (covered call)
2. Combinations of options: concepts and calculations
   Spreads: use two or more options of the same type
   Bull spreads, bear spreads, and butterfly spreads
   Straddles: use puts and calls on the same stock; when to use straddles
   Strangles: buying a strangle vs. writing a strangle; when to use strangles
3. Examples discussed in class and homework problems
Chapters 12&13

1. One-step binomial model: concepts and calculations
2. Risk-neutral valuation: concepts and calculations
3. Two-step binomial model: concepts
4. Black-Scholes option pricing model: concepts and calculations
5. Delta, Gamma, Theta, Vega, and Rho: concepts

Chapter 15

1. Options on a stock paying a continuous dividend yield
   Lower bounds
   Put-call parity
   One-step binomial model
   B-S model
2. Options on stock indexes: concepts, applications, and calculations
3. Currency options: concepts, applications, and calculations
4. Examples discussed in class and homework problems

Chapter 16

1. Options on futures: concepts and applications
2. Valuation models: concepts and calculations
   Lower bounds
   Put-call parity
   One-step binomial model
   Black’s model
3. Comparison of options and futures options
4. Examples discussed in class and homework problems
**Sample problems**

**Chapter 9**
A stock sells for $50.00 and a 55 call option sells for $2¼. What is the intrinsic value of the call? What is the time value of the call?

Answer: Intrinsic value = 0 (out-of-the-money option); Time value = $2¼

**Quiz 9.6**
Answer: the exercise price will be reduced to $30 and each call option gives the holder the right to purchase 200 shares of the underlying stock

**Problem 9.22**
Answer: $5,950 from 1st alternative = 500*(3.50 + 0.2*57 - 3) since the option is $3 out of the money
$4,600 from 2nd alternative = 500*(3.5 + 0.1*57)
Take $5,950

**Chapter 10**
Quiz 10.2: check the lower bound; if it is violated you can arbitrage

Quiz 10.4: see the textbook for the answer (early exercise of American call options on non-dividend paying stocks is never optimal)

You are interested in XYZ stock options. You noticed that a six-month call option with the exercise price of $50 sells for $2.00, while a six-month put option with the same exercise price sells for $3.50. The 6-month interest rate is 6%, and the current stock price is $48. There is an arbitrage opportunity present. Show how you can take the advantage of it.

Answer: $c + K e^{-rT} = 2 + 50 e^{-0.06 (0.5)} = 50.52$
$p + S = 3.5 + 48.00 = 51.50$
Arbitrage opportunity exists: $p$ and $S$ are too high relative to $c$

<table>
<thead>
<tr>
<th>Stock Price at Expiration</th>
<th>If $S_T &gt; 50$</th>
<th>If $S_T \leq 50$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Buy a 50 call @</td>
<td>2.00</td>
<td>$(S_T - 50)$</td>
</tr>
<tr>
<td>Deposit $48.52 (present value of 50)</td>
<td>48.52</td>
<td>50</td>
</tr>
<tr>
<td>Short a share @ $48.00</td>
<td>48.00</td>
<td>$-S_T$</td>
</tr>
<tr>
<td>Write a 50 put @ $3.50</td>
<td>3.50</td>
<td>0</td>
</tr>
<tr>
<td>Net</td>
<td>$0.98</td>
<td>0</td>
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</tbody>
</table>
Chapter 11
Quiz 11.1: see the textbook for the answer
Quiz 11.4: see the textbook for the answer
Quiz 11.7: see the textbook for the answer

Chapters 12&13
Quiz 12.4: see the textbook for the answer (one step binomial for put)
Quiz 12.5: see the textbook for the answer (one step binomial for call)
Quiz 13.4: see the textbook for the answer (B-S model for put)
Quiz 13.5: see the textbook for the answer (B-S model for put with dividend)

Chapter 15
Quiz 15.2
Once we know how to value options on a stock paying dividend yield (continuous dividend) we know how to value options on stock indexes and currencies.

Quiz 15.3
A stock index = 300, q = 3%, r = 8%, what is the lower bound for a 6-month call option on the index if \( K = 290 \)

Answer: \( c \geq S_0 e^{-qT} - K e^{-rT} = 16.90 \), if \( c \) is lower than that you can arbitrage

Chapter 16
Quiz 16.4
One-step binomial model on futures options, refer to the answer at the end of the book (pay attention to \( p \))

Quiz 16.5
Answer: replace \( S_0 \) by \( F_0 e^{rT} \)

Quiz 16.7: see the textbook for the answer