Print Last Name: ➔	Print First Name: ➔	ID Number: ➔	
COURSE FINANCE	**NUMBER** FINA 385/2	**SECTION:** A	
EXAMINATION Final Exam	**DATE** Dec 12, 2010	**TIME** 3 hours	**# OF PAGES 16** including cover
INSTRUCTOR: D. Newton		**DIVISION** John Molson School of Business Concordia University	

READ THESE SPECIAL INSTRUCTIONS CAREFULLY

- You are allowed one 8.5x11 sheet of paper (double sided); You may write, type, draw or copy anything on this sheet.
- You are allowed a non-programmable financial or scientific calculator.

- For Multiple Choice Questions,
All answers must be recorded IN PENCIL on the computer sheet.

- For Problems:
All answers must be recorded IN PEN (INK) on the exam booklet.
All answers must be recorded within this exam.
Show your calculations to earn part marks. Write in the space provided.

- **Cell phones must be turned off, programmable calculators and PDAs are not allowed.**

- **Please ensure you have 15 pages (including cover) in this exam.**

- **Fill in your name and other required information IN PENCIL on the Computer Answer sheet as well as on this cover sheet.**
- **Blank questions or those with multiple answers will not receive credit.**
- **Translation dictionaries are allowed if approved by professor at start of exam.**

REMINDER: Put your Name and ID on (1) this exam; (2) computer answer sheet and (3) Your Crib Sheet. Hand in this exam, computer sheet and your Crib Sheet.

Multiple-choice questions

1. Bond A and Bond B are trading at the same price today and they both mature today as well. If A and B were issued by the same company but had 5 years and 10 years to maturity respectively what can you infer about their original prices?

a) Both of the bonds had the same price at date of issuance
b) Both of the bonds were issued at a discount
c) Bond A was issued at a discount while Bond B was issued at a premium
d) Bond B was issued at a discount while Bond A was issued at a premium
e) We cannot infer anything about their original prices with the information given

2. Christian has an open margin position on VBN stock. He has 1000 shares in the account which are presently trading at $71.32. If the stock price was $50 when he bought the shares and he borrowed $25K on margin to open the account, what rate of return on his capital would he realize if he shut his position now?

a) 1.85%
b) 42%
c) 85%
d) 92%
e) 185%

3. Using the information above and knowing that the maintenance margin for Christian's account is 10%, what is the closest dollar amount VBN shares could fall by before triggering a margin call?

a) $27.50
b) $27.78
c) $43.54
d) $43.82
e) $44.19

4. AZT shares are trading at $9.30 today. A European put option with a strike of $5 and which expires exactly 1 year from now has a value of $4. If the current interest rate is 2%/year what is the value of a 1 year American call option on AZT with a strike of $5?

a) Less than $4.39
b) $4.39
c) $8.20
d) $8.40
e) More than $8.40

5. All else equal and assuming both information asymmetry and optimal capital structure decisions, if a company increases its dividend one would expect:

a) The price of the put to decrease because the company is profitable indicating future stock price increases
b) The price of the call to decrease because the company has a reduced value after making a cash-payout for the dividends
c) The price of the put to increase because the company is more likely to default as it now has reduced cash holdings
d) The price of the call to increase as the company has signaled future profitability
e) All derivative prices to remain constant as the MM proposition ensures no value changes have occurred

6. The CDCC (OCC in the US) serves the role of a clearinghouse in the derivatives market. Which of the following situations would most likely pose the greatest threat to the stability of the clearinghouse?

a) A single hedge funds sells $790 billion of deep out of the money calls on a particular security and that security's price dramatically increases
b) A large number of hedge funds sell $1 trillion of deep out of the money calls on a particular security and that security's price dramatically increases
c) A large number of hedge funds buy $1 trillion of deep out of the money calls on a particular security and that security's price dramatically decreases
d) A single hedge funds buys $790 billion of deep out of the money calls on a particular security and that security's price dramatically decreases
e) The government mandates that all derivative investors must maintain a larger margin on their accounts

7. You have just closed a short position in 100 orange juice future contracts are about to expire and have a price of $168 each. If you just realized a gain of 10% on the trade and had posted 100% margin what is the spot price of orange juice?

a) $100
b) $152.72
c) $168
d) $184.80
e) $200.11

8. You're a junior economist working at a central bank and in analyzing your data you observe severe backwardation in the future prices of virtually all commodities (oil, steel, copper, etc…). This is troubling because:

a) It suggests you made an error in your analysis and are likely to be fired
b) It suggest the end of the world is coming very soon
c) It suggests that pensioners will be unable to afford to meet their fixed cost obligations and a rash of defaults will occur in this segment of the population
d) It suggests that the economy is on the brink of a downward deflationary spiral that may arrest all growth in consumption
e) It suggests that borrowing will become impossible and a credit crisis is likely to ensue

9. Operation Twist, conducted in the US, was an attempt to flatten out the yield curve. The hope was that this would increase economic activity through which of the following mechanisms?

a) By keeping long term borrowing rates low businesses would be given incentive to spend money today
b) By keeping long term borrowing rates low businesses would have less fear to spend accumulated money today
c) By relatively raising short term borrowing rates businesses would de-leverage and reduce credit crisis risk
d) By relatively raising short term borrowing rates businesses would be encourages to buy US treasuries reducing the cost of government borrowing
e) By convincing everyone that it was time to do the "twist" dance they'd all be happy and would start spending again

10. Tim runs a regression on all Canadian stock returns against 100 factor time-series from a Statscan database and identifies two factors which are significant at better than 5% (p-value <0.05) and one factor at better than 1% (p-value <0.01). These factors are GDP, the Salmon catch in the Fraser valley and teenage smoking rates. Which of the following critiques of Tim's model are appropriate?

a) Tim's model likely invites spurious correlation as he has regressed so many factors and was expected to find at least five 5% significant factors and one 1% factor out of 100 possible regressors.
b) Tim has conducted a data-mining exercise which was not guided by theory and we should suspect the validity of his findings
c) Statscan data is generally not reliable and Tim should not use it
d) Both A and B
e) A, B and C are all true

11. Your friend Sarah has recently inherited some money and she'd like to take a small portion of it to invest. As you're a Finance graduate she asked your investment advice and you've acquired the following information about Sarah's beliefs and desires:
    - Sarah would like the guarantee that she does not lose too much of her inheritance though she can risk losing a little
    - Sarah would like a small positive gain on her portfolio and is willing to sacrifice some maximum returns (upside potential) to increase the chances of a modest gain
    - Sarah does not want her net cost of setting up the position to be too expensive
    - Sarah believes the market is generally increasing over time

    Which derivative strategy would best suit Sarah's wants?

a) Long Butterfly spread on a market ETF with the strikes at the money
b) Long Straddle spread on a market ETF with the strikes at the money
c) Long Protective put on a market ETF with the put deep out of the money
d) Long Bullish spread on a market ETF with the long call just in the money
e) Short Bullish spread on a market ETF with the long call deep in the money

12. CXM bonds just fell 3.4% while interest rates increased 2%. If CXM bonds have a modified duration of 2 then you might infer

a) The risk of CXM bonds has decreased
b) The risk of CXM bonds has remain unchanged
c) The risk of CXM bonds has increased
d) CXMs duration estimate may be too low
e) Nothing can be inferred from this data

13. Risk-neutral probabilities:

a) Are natural and could be likened to a lens that distorts objective probabilities to make an individual appear risk-neutral
b) Are natural and could be likened to a lens that distorts objective probabilities to make an individual appear risk-averse
c) Are unnatural and could be likened to a lens that distorts objective probabilities to make an individual appear risk-neutral
d) Are unnatural and could be likened to a lens that distorts objective probabilities to make an individual appear risk-averse
e) Are the probabilities that objective probabilities become when individuals act rationally in accordance with expected utility theory (EUT)

14. Gary runs two regression models of stock returns. In model 1 he gets an adjusted R^2 of about 25% and has average out of sample errors of 25%. In mode l 2 he gets an R^2 of 75% and out of sample errors of 95%. Which of the following critiques is most appropriate?

a) Model 2 reports R^2 and not adjusted R^2, thus the fit of the model may actually be much lower
b) Model 1 almost certainly has fewer degrees of freedom than Model 2
c) Model 1 and 2 should be only tested in-sample
d) Statements A and C are both valid critiques
e) Statements A,B, and C are all valid critiques

15. Marie has developed a pricing model where she believes that for each unit of excess market risk a stock gains 3% in return expectations while for each unit of credit default risk it gains 2.3% in expectations. If the risk-free rate is 2% and ABC stock has 1.1 units of market risk and 0.7 units of credit default risk then:

a) ABC is expected to return 4.91% and a good example of the company would be lowly levered luxury manufacturer
b) ABC is expected to return 6.91% and a good example of the company would be lowly levered luxury manufacturer
c) ABC is expected to return 4.91% and a good example of the company would be highly levered luxury manufacturer
d) ABC is expected to return 6.91% and a good example of the company would be highly levered luxury manufacturer
e) ABC is expected to return 4.91% and a good example of the company would be highly levered utility

16. Orcus is looking over the results of your portfolio optimization when he exclaims "You've made an elementary mistake. I see that the covariance between company A and B is -1.3 but that's not possible as it should be bounded. Go back and repeat your analysis." Given that you need a job, your best response is:

a) Sir, I quit
b) Sir, while it's true that correlation is bounded it's entirely possible for beta to have a negative value less than negative one
c) Sir, while it's true that covariance is bounded it's entirely possible for correlation to have a value below negative 1
d) Sir, while it's true that correlation is bounded it's entirely possible for the root of covariance to have a negative value
e) Sire, while it's true that correlation is bounded it's entirely possible for the covariance to have a value that is less than negative one

17. UIO bonds have a modified duration of 3 and interest rates are expected to increase by 1.5%. You expect:

a) UIO bonds to have an increase in their yield equal to 1.5%
b) UIO bonds to have an increase in their price equal to 4.5%
c) UIO bonds to have a decrease in their yield equal to 4.5%
d) UIO bonds to have an increase in their yield equal to 4.5%
e) UIO bonds to have a decrease in their price equal to 4.5%

18. Wesley receives $300 to $500 each year as gift money from his extended family. However, he'd really like to buy a new computer now which he can pay on a monthly plan of $30/month for 36 months. Which financial security would best help him realize his goal?

a) ETF
b) Put option
c) Forward contract
d) Swap
e) T-bill

19. What is NOT one of the primary advantages of investing in a broad index-tracking ETF?

a) It is likely to be diversified
b) It is likely to hedge currency risk
c) It is likely to have a lower MER than many mutual funds
d) It is likely to be liquid
e) It is likely to be the underlying of options allowing for hedging

20. At present the US is still trying to resolve the financial crisis brought on by excessive lending in their housing market. Why might a plan, which allows for certain qualified home-owners to extend the terms of their mortgage past the original maturity date, not have the desired effect to stimulate the economy?

a) Such a plan may reduce future spending growth for a very slight increase in spending now
b) Such a plan may cause house prices to fall further immediately as new credit becomes available
c) Such a plan would not interfere with Adam Smith's invisible hand
d) Such a plan would decrease operational efficiency in the stock market
e) Such a plan would depreciate the US dollar against other currencies

Problem 1

Bob Schtack believes in the Black and Scholes option pricing model while Binder Morselle believes in the binomial option pricing model. Both Bob and Binder are trying to price a European call option on TTL stock and which has a strike price of $10 and 1 year to expiration. Both Bob and Binder agree that the one year risk-free rate is 2.02%/year and that TTL stock is presently trading at $15/share.

Bob has also estimated the annual standard deviation of TTL stock to be 34.7% while Binder estimates that TTL stock price will either increase by 20% or decrease by 20% in exactly one year's time.

A table of the cumulative normal distribution function is provided below for your use.

d	-2	-1.8	-1.6	-1.4	-1.2	-1	-0.8	-0.6	-0.4	-0.2
N(d)	0.0228	0.0359	0.0548	0.0808	0.1151	0.1587	0.2119	0.2743	0.3446	0.4207

d	0	0.2	0.4	0.6	0.8	1	1.2	1.4	1.6	1.8
N(d)	0.5000	0.5793	0.6554	0.7257	0.7881	0.8413	0.8849	0.9192	0.9452	0.9641

(If you cannot find the exact value needed, you may simply use the closest one available)

a) Compute Bob's estimate of the call price

b) Compute Binder's estimate of the call price. Be certain to state the Delta hedge-ratio and the risk-neutral probabilities for Binder's model.

c) Assuming Bob and Binder each continue to believe their model and that each has $1001 they'd be willing to spend, what transaction can you anticipate occurring? Assume for simplicity that the trade occurs at the average of the bid and ask prices. Next, compute the return of each of Bob and Binder's positions if TTL stock price increase to $17 by year's end.

d) Give a common criticism of both Binder and Bob's model that would make you wary of using their call price estimates.

a) C = S_0 N(d1) – Xe^{-rt}N(d2) = 15N(d1) – 10(0.98)N(d2)

d1 = [ln(15/10)+(0.0202+0.2^347/2)1]/0.347=1.4
d2 = 1.4-0.347(1) = 1.053~1
N(d1) = 0.9192
N(d2) ~ 0.8413

C = 15(0.9192) – 10(0.98)(0.8413) = 13.788-8.24474 = 5.54326 ~ $5.54

Bob values the option at $5.54

b) u=1.2, d=0.8, so the risk-neutral probabilities are:

p=(e^{-rt}-d)(u-d) = 0.22/0.4 = 0.55 chance up and therefore 45% chance down

fu = max(S-X,0) = max(18-10,0) = 8
fd = max(S-X,0) = max(12-10,0) = 2

Delta = (fu-fd)/[S_0*(u-d)] = (8-2)/(15(0.4)) = 1

f=e^{-rT}[pfu+(1-p)fd] = 0.98(0.55*8+0.45*2) = 5.194

Binder values the option at $5.19

c) As Binder's value (5.19) is less that Bob's (5.54), Binder will sell calls to Bob. The mid-price of the bid and ask would be: (5.19+5.54)/2 = 5.367 = $5.37

Bob will purchase $1001/5.37 = 186 contracts for 998.82

Bob's payoff will be: [186*max(17-10,0)-1001]/1001 = +30.069%
Binder's payoff will be: [998.82+1001-186*max(17-10,0)-1001]/1001 = -30.287%

{Note to grader, if the student says that the game is zero-sum and notes that both individuals have the same dollar amount of initial capital I will accept them computing just one rate of return and then simply multiplying it by -1 to estimate the other individual's rate of return}

d) Both models are making assumptions that are unrealistic. Any one of the following should award full points. -Stock returns are neither binomially distributed nor normally distributed
   - Transaction costs are not zero in either case
   - There is no "risk-free" security in reality
   - Both models require a continuously rebalanced position which, even without transaction costs, is not feasible
   - Both models require estimates as inputs which means the model can only ever be as good as those estimates (st.dev, etc…)

Problem 2

Kira is a hedge fund manager and she's identified an arbitrage which she wishes to take advantage of. She can buy one portfolio at the price B given by the expression:

$B = k_B N^{0.5}$

And then sell a portfolio with identical risk exposure at the price of:

$S = k_S N^{-0.5}$

Where N is the number of trades she makes. However, she faces transaction costs, T, that increase at a decreasing rate and are given by the expression:

$T = k_T N^{0.5}$

Thus her overall arbitrage profit for N trades is:

$Profit = (S-B)N - T$

Where k_B, k_S and k_T are all constants.

a) Consider the expressions for B and S. Explain intuitively how and why these average prices change as N, the number of trades Kira makes, increases.
[Optional hint: If you are comfortable with calculus you may want to take the first derivative of the expressions. This is NOT necessary for full marks though]

b) Assuming Kira wants to maximize profit, use the expressions above to find the expression for the optimal number of trades (N^*) that Kira should make.

c) Considering the solution you got in part b), explain why reducing transaction costs would increase market informational efficiency.

d) Now consider your answer in part c). If the market's operational efficiency has been increasing over time and hedge fund managers have been optimizing their trades in a way similar to Kira explain why systemic risk might be increasing. [Hint: Consider what would happen if Kira's model that gave her the arbitrage position was wrong]

a) B, the price of purchase, is increasing in N. This is because as Kira tries to buy more and more of a portfolio she'll push up the price of the constituent assets in that portfolio

Conversely, S is the price of sale, and is decreasing as Kira engages more and more in her trades. This is because as she short-sells the first portfolio she'll put downward pressure on the prices of the constituent assets.

By calculus: $dS/dN = -0.5k_S N^{-1.5} < 0$, decreasing price as N increases
$dB/dN = 0.5k_B N^{-0.5} > 0$, increasing price as N increases

b) Profit $= (S-B)N - T = (k_S N^{-0.5} - k_B N^{0.5})N - k_T N^{0.5} = (k_S N^{0.5} - k_B N^{1.5}) - k_T N^{0.5}$
$dP/dN = (0.5k_S N^{-0.5} - 1.5k_B N^{0.5}) - 0.5\, k_T N^{-0.5} = 0$ (FOC)
Multiply everything by $2N^{0.5}$
$k_S - 3k_B N - k_T = 0$
Isolate for N
$N^* = (k_S - k_T)/3k_B$

c) If kT is lower (that is lower transaction costs) then the total number of trades Kira engages in will be greater (N increases as transaction costs fall). Thus Kira's information about a mispricing in the market will be put into the prices (B, S) more as kT falls. That is, information in the prices are increased as operational efficiency increases

d) Systemic risk might be increasing because all hedge fund managers will be taking ever-increasing bets (N) as the transaction costs fall. This means that the funds are likely going to be very leveraged and/or have massive notional amounts on which they are making their arbitrages. If their models are wrong then their positions will possibly have become so large as to endanger other financial institutions or even the clearinghouse. A systematic shock might be introduced into the economy by a few bad arbitrage models being so levered as to endanger the entire financial system.

Problem 3

Dacio manages the WER pension plan. He's considering one of two Government of Japan bonds to add to the plan. Bond A has 5 years to maturity, pays annual coupons equal to 3% to the face value and presently trade at par. Bond B is an interest only strip produced from a bond that has 10 years to maturity and which pays annual coupons equal to LIBOR +1%. The strip presently trades for $313.51 and is expected to make a payment of $40 in one year's time.

a) Compute the YTM and Duration of bond A

b) If interest rates increased by 2.3%, what is the expected price change for bond A? Why is this an estimate and not exact?

c) Assuming the forward yield curve for LIBOR is flat and that bond A and bond B have the same yield, find LIBOR.

d) Suppose Bond B better suits Dacio's needs but he doesn't like the fact that it pays an uncertain coupon that is a function of LIBOR given that he is managing a pension plan and wants defined cash in-flows. In brief, describe what an interest rate Swap is and then explain how Dacio might use one to get the certainty in cash-flows that he desires.

a) The bond is trading at par, the YTM will equal the coupon rate, which happens to be 3%/year.

   D = (1+y)/y – [1+y+T(y-c)]/(c[(1+y)^T-1]+y)
   D= 1.03/0.03 – (1.03)/(0.03*(1.03^5-1)+0.03)
   D=34.3333 – 29.61623 = 4.717

b) The price change estimate is:
   -4.717*(2.3%) = -10.85% or in dollar terms, -$108.50 given that the bond is presently at par

c) If the yield-curve it flat this implies that LIBOR is not expected to change over time, thus the coupons are at the moment assumed to be constant.

   PMT = (1000*(LIBOR+1)) = ?, PV = -313.51, FV = 0, N = 10, YTM = 3%
   <CPT> PMT = 36.75 so Libor must be 2.675% presently.

d) An interest rate swap is an arrangement where one party surrenders a cash-flow based on some notional value and receives another cash-flow as a function of the same notional value.

   In this instance Dacio will surrender an uncertain cash-flow which is determined by LIBOR and receive in exchange a fixed rate from a counterparty. Dacio should be prepared to pay a small spread to an intermediary which sets up the swap agreement and possibly an additional and hopefully small premium to the counterparty who is now receiving an uncertain cash-flow in exchange for their certain cash-flow.