Question 1: Derivative Definitions (40 Total marks, 1 mark for each)

Enter your answers on the scantron bubble sheet. If more than one answer is given for any item, that item will not be marked. Incorrect answers will be zero. Explanations provided beside the answers will not be read.

True or False?

1. There are many exchanges throughout the world trading forward contracts.
2. There are two basic types of options: forwards and futures.
3. Arbitrageurs always enter into two or more transactions simultaneously.
4. Arbitrage opportunities last for a long time.
5. When an option on Google stock is exercised, Google issues more stock.
6. A call option will always be exercised at expiration if the underlying price is greater than the strike price
7. A put option will always be exercised at expiration if the strike price is greater than the underlying price
8. Interest rate swaps involve a single cashflow
9. The value of a call generally increases when the underlying price decreases. Assume all else stays constant.
10. A futures price can be contrasted with the spot price. The spot price is for immediate, or almost immediate, delivery. The futures price is the price for delivery at some time in the future. The two are usually equal.
11. The Chicago Mercantile Exchange has introduced futures contracts on weather.
12. All trading of forwards is done on exchanges.
13. Financial institutions often act as market makes for the more commonly trading instruments. This means that they are always prepared to quote both a bid price and an offer price.
14. Options are only traded on exchanges.
15. A call option gives the buyer the right to buy an asset by a certain date for a certain price.
16. A put option gives the seller the right to sell an asset by a certain date for a certain price.
17. An option buyer must pay an up-front price, known as the premium, to exercise an option.
18. The price of a call option increases as the strike price increases.
19. The price of a put option increases as the strike price increases.
20. Three broad categories of trader can be identified: hedgers, speculators, and arbitrageurs.
21. Unlike futures, forwards require the payment of an up-front fee.
22. Arbitrage involves locking in a risky profit by simultaneously entering into transactions in two or more markets.
23. There are three types of options: call, puts, and swaps.
24. As the delivery period for a futures contract is approached, the futures price converges to the spot price of the underlying asset.
25. Credit risk has traditionally been a feature of the over-the-counter markets. There is always a chance that the party on the other side of an over-the-counter trade will default.
26. A short hedge could be used by a farmer who owns some hogs and knows that they will e ready for sale at the local market in two months.
27. LIBOR is short for London Interbank Opening Rate.
28. Large banks and other financial institutions quote LIBOR for maturities up to 12 months in all major currencies.
29. A repo is a contract where an investment dealer who owns securities agrees to sell them to another company now and buy them back later.
30. The relationship between futures prices and spot prices can be summarized in terms of the cost of carry. This measures the storage cost minus the interest that is paid to finance the asset less the income earned on the asset.
31. Contracts such as swaps that are private agreements between two companies entail no credit risk.
32. An option gives the holder the right to do something. The holder does not have to exercise this right.
33. Whereas the purchaser of a call option is hoping that the stock price will decrease, the purchaser of a put option is hoping that it will increase.
34. For an investor who has written a call, if the option is exercised, the investor is required to sell stock at the strike price.
35. For an investor who has written a put, if the option is exercised, the investor is required to sell stock at the strike price.
36. Many companies are in the position where their performance is liable to be adversely affected by the weather. These companies can now consider hedging their weather risks using weather derivatives.
37. When there are risks to be managed, derivative markets are slow and have historically lacked innovation when developing products.
38. Since the mid-1980s there have been very few losses in the derivatives markets.
39. It is less important that companies monitor risks carefully when derivatives are used.
40. When derivatives are used for hedging, they have only a few of the same characteristics as insurance contracts.

Forwards and Futures (10 total marks, 1 mark each)

Specify whether each of the below is a characteristic of a:

a) forward b) future c) neither d) both

41. An agreement to buy or sell an asset at a certain time in the future for a certain price
42. Private contract between 2 parties
43. Non-standard contract
44. Exchange traded
45. Range of delivery dates
46. Usually 1 specified delivery date
47. Delivery or final cash settlement usually occurs
48. Contract usually closed out prior to maturity
49. Settled at the beginning of the contract
50. Settled daily

Multiple Choice (30 Total marks, 2 marks for each answer)

51. If there is no arbitrage opportunity, (rounded to the nearest dollar) what is price of a 6-month future contract on the TSX stock index which has a current value of the index 13,500, the continuous compounded riskfree interest rate is 3.5%, and the stocks in the TSX index provide a dividend yield of 1.0%?
    a) $13,670
    b) $13,738
    c) $13,842
    d) $14,479

52. A short forward contract on a non-dividend paying stock was entered into some time ago at a delivery price of $24. It currently has six months to maturity. The risk-free interest rate is 5% and the current stock price is $25. Find the current value of the forward contract.

    a) – $1.63
    b) – $1.59
    c) $1.59
    d) $1.63
    e) $24.00

53. On May 1, an investor takes a short position in ten December gold Futures contracts on the New York Commodity Exchange (COMEX). The current Futures price is $1,600, the contract size is 100 ounces, the initial margin is $2,000 per contract, and the maintenance margin is $1,500. If by the end of May 1 the Futures price has dropped to $1,598:

    a) the margin balance increases by $200.
    b) the margin balance increases by $2000.
    c) the margin balance decreases by $2000.
    d) the investor receives a margin call.
    e) the broker automatically closes out the position.

54. Which option, given only the difference below, assuming all else is the same, has the lower premium?

    a) 40 Call or
    b) 50 Call

55. Consider a 1-year Futures contract to buy one corporate bond. The current spot price of the bond is $920.00, the continuous interest rate for 1-year is 10%. One coupon payment of $10.00 will be paid in 9-months. If the Futures price of the bond in the market is $1003, an arbitrage profit can be generated by:

a) shorting the Futures contract and short selling one Bond.
b) shorting the Futures contract and buying one Bond.
c) taking a long position in the Futures contract 9-months from today.
d) taking a long position in the Futures contract and buying one Bond.
e) taking a long position in the Futures contract and short selling one Bond.

56. An investor has an asset that is currently worth $500, and the continuously compounded rate at all risk-free maturities is 3 percent. If the asset pays a continuous dividend of 3 percent, which of the following is the closest to the no arbitrage price of the 3-month forward contract?

a) $496.26
b) $500.00
c) $502.00
d) $503.00
e) $503.76

57. The three month interest rates in New Zealand and Canada are 6% and 4% per annum respectively, with continuous compounding. The spot price of one New Zealand Dollar is Canadian Dollars 0.80. (i.e. 1 NZD = 0.80 CAD). What is the theoretical value of the 3 month futures contract?

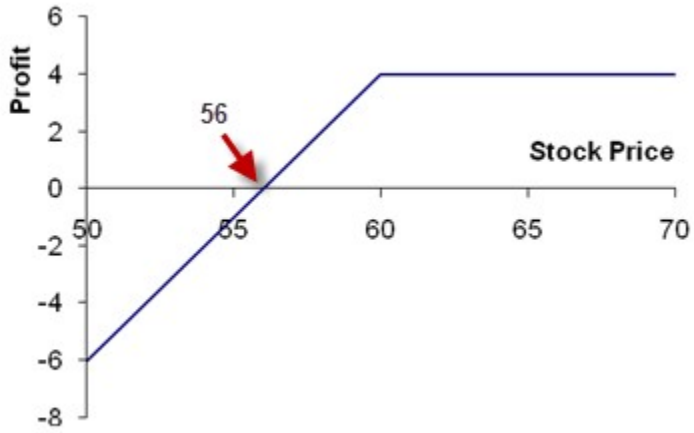
a) 0.7960
b) 0.8000
c) 0.8040
d) 0.8080
e) 0.8162

58. Which option, given only the difference below, assuming all else is the same, has the lower premium?

a) 100 Put or
b) 80 Put

59. In the Chicago Board of Trade's corn futures contract, the following delivery months are available: March, May, July, September, and December. State the contract that should be used for hedging when the expiration of the hedge is in June:
a) March
b) May
c) July
d) September
e) December

Basic Option Definitions



60. This option is a
    a) Call
    b) Put

61. This graph shows the position of the
    a) buyer
    b) seller

62. What is the option's strike price?
    a) 55
    b) 56
    c) 60
    d) cannot tell from graph

63. What is the premium?
    a) 0
    b) 4
    c) 56
    d) 60

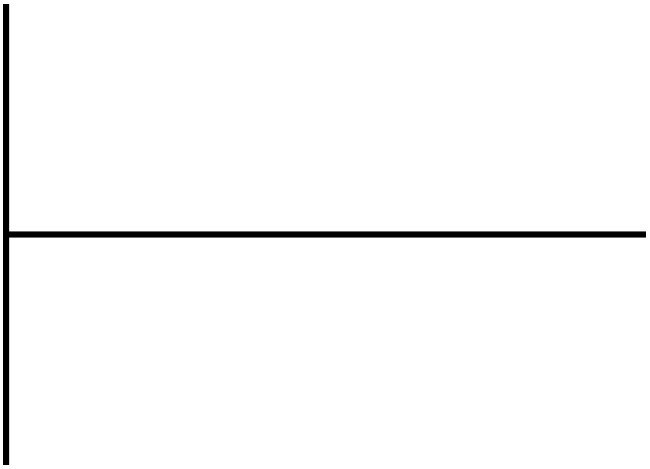
64. What is the most that can be made?
    a) 0
    b) 4
    c) 70
    d) Unlimited

65. What is the most that can be lost?
    a) 4
    b) 6
    c) 56
    d) Unlimited

STOP using the Scantron Sheet now. Write directly on the test in the blanks provided.

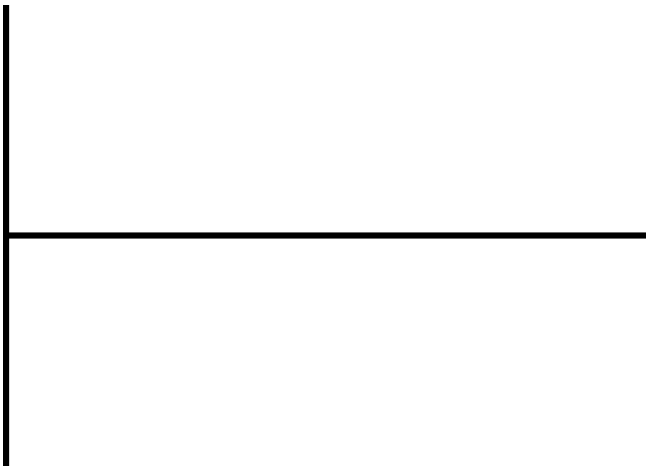
a) Graphing Diagrams (9 marks total. 3 marks each)

66. (3 marks) Sell an 80 Put for 6



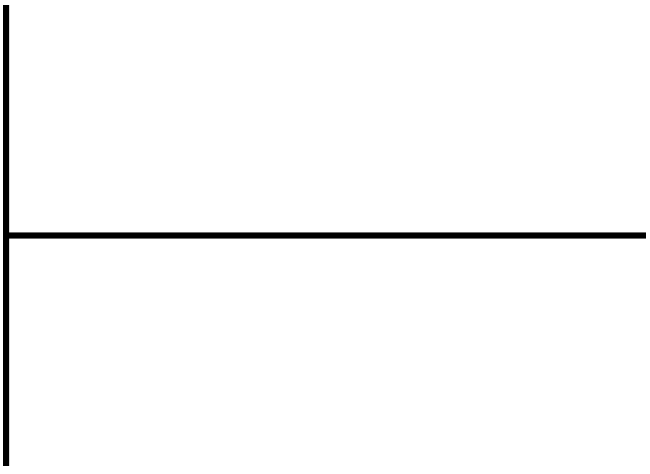
Breakeven = _____

67. (3 marks) Buy a 110 Call Put for 10



Breakeven = _____

68. (3 marks) Buy a 40 Put for 3



Breakeven = _____

Arbitrage (10 marks total)

69. A stock price is quoted as £100 in London and $162 in New York. The current exchange rate is 1.6500 USD per one GBP. (2 marks)

a) Is there an arbitrage opportunity? (circle: yes or no)

b) If so, what trades will you do?

Given a forward contract to purchase a non-dividend-paying stock in three months. Assume the current stock price is $40 and interest rates are 5% per annum. (5 marks)

70. What is the theoretical value of the forward?
(use continuous interest & answer to four decimal places) Answer = _____

71. Is there an arbitrage opportunity in the following examples?

a) When the forward price = $40.00? (circle: yes or no)

b) When the forward price = $43.00? (circle: yes or no)

c) When the forward price = $39.00? (circle: yes or no)

72. What trades should be done to profit when the forward price = $45? (max 5 sentences please)

Transaction #1: _____

Transaction #2: _____

Transaction #3: _____

Additional Transactions?:

The spot price of a stock that is expected to pay a $1 dividend in the next year, at the very end of the year, is $60. Interest rates are 10% and the one year forward on this stock is trading at $70.
(3 marks)

73. Do you want to trade? (circle: yes or no)

74. If so, what trade(s) will you do and how much do you expect to make? Profit = _____

Transaction #1: _____

Transaction #2: _____

Transaction #3: _____

Additional Transactions?:

Hedging with Forwards and Futures (6 marks total)

On May 15, a farmer in Manitoba planted 360 acres of flaxseed (estimated total production is 200 tonnes) and decided to hedge with futures 100 per cent of anticipated production. The Winnipeg Commodity Exchange offers Flaxseed Futures and Flaxseed Options.
1 futures contract = 20 tonnes and the price on May 15 was $320 per tonne.

75. Did the farmer buy or sell futures? (circle: buy sell)
(1 mark)

76. How many contracts? Answer = _____
(1 mark)

On December 15, the farmer sells the harvested crop at a market price of $430 per tonne and closes out the January futures position at $440 per tonne. What is the farmer's overall, effective price per tonne?
(2 marks)

77. Answer = _____

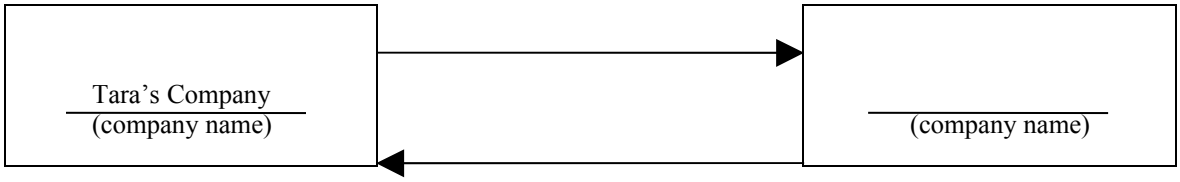
If, instead, the cash crop price was $190 and the futures price was $200, what is the overall, effective, price per tonne?
(2 marks)

78. Answer = _____

Interest Rate Swap (5 marks)

An example interest rate swap contract traded today might be for me (Tara's Company) to pay a fixed interest rate (10.75% on $10,000,000 every six months) and receive a floating rate (LIBOR) from you (Your Company) for the next 3 years.

79. Label the boxes and arrows illustrating the direction of cash flows between Tara's Company and Your Company.



80. If, at the end of the first six month period, six month LIBOR is observed in the market at 12% who pays who? (please circle)

Tara's company pays you You pay Tara's company

Forward Rates (10 marks total, 2 marks each)

Suppose that zero interest rates with continuous compounding are as follows:
1 year zero rate = 2.0% rate per annum
2 year zero rate = 4.0% rate per annum
3 year zero rate = 4.70% rate per annum
4 year zero rate = 5.2% rate per annum
5 year zero rate = 5.5% rate per annum
Calculate forward interest rates to two decimals for:

81. One to two years, Answer = _____

82. Two to three years, Answer = _____

83. Three to four years, Answer = _____

84. Four to five years, Answer = _____

85. If you had entered into a Three to Four year FRA in the past that allowed you to Receive 10%, what is the value of this FRA? (to two decimal places)

Answer = _____

Futures Pricing & Arbitrage (15 marks)

86. A trader is currently monitoring prices for a number of different variables and notices that:
    - The current spot rate (S_0) for cattle is $1.00 per pound.
        - The costs to feed cattle are $0.01 monthly per pound which is paid at the **beginning of the month**.
        - There is a rental agreement to house 20,000 pounds of cattle which costs $4,000 annually. This is payable quarterly at the **end of quarter**.
          Q1 is Jan – Mar, Q2 is Apr – Jun, Q3 is Jul – Sep and Q4 is Oct – Dec
        - Currently there is ONLY 80,000 pounds of cattle available for purchase or sale in the spot market
    - The current continuous risk-free rate is 5% per annum
    - Today is January 1st
    - The theoretical value of a 1-month Future = 1.05

(a) A trader observes that
- Currently the actual market price for a 1-month Futures price on cattle is $1.15 per pound.
- A 1-month futures contract is for delivery of 40,000 pounds of cattle

Explain exactly what transactions might a trader enter into? (maximum of 5 sentences)
(4 marks)

Transaction #1: _____

Transaction #2: _____

Transaction #3: _____

Additional Transactions:

(b) As result of entering into the transactions described in part (b), **calculate**

- the total cash flows when the transaction was initially entered into (t=0) and
- at every important point in time

Please fill out the below table to answer part (c) of the question. Use 2 decimals for cash flows and as many time periods as you need.
(11 marks)

Time period	Transaction(s)	Cash flows from each transaction (-) means cash outflow (+) means cash inflow
t = __0__		
t = (when?) _____		
t = _____		
t = _____		
t = _____		
t = _____		
t = _____		

Short Answer / Participation

Please answer ONE of the following for participation marks:

a) Which currencies would you be more or less inclined to hedge against if you were a Canadian exporter? How do you know this?

b) LIBOR has been covered heavily in the media lately. Why?

c) In the US, are short-term rates projected to go lower or higher? Why do you know the answer to this question?

THE LAST PAGE OF THE EXAMINATION