

UNIVERSITY OF FORT HARE

Derivative Markets
ECF 525E

DEGREE EXAMINATIONS

NOVEMBER

2019

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Time: 3 Hours
Subject: ECF 525E
Marks: 100

This paper consists of 5 pages including the
cover page

Internal Examiners

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External Examiners

Dr G Ndlovu

INSTRUCTIONS TO CANDIDATES:

Answer ALL QUESTIONS in Section A

Answer ANY THREE questions, with ONE QUESTION FROM EACH SECTION in Sections B, C and D

All questions carry equal marks

SECTION A

1. Arbitrage prevents:

- A. market efficiency
- B. profit higher than the risk-free rate of return
- C. Two assets with identical payoffs from selling at different prices

2. Which of the following statements about exchange-traded derivatives is least accurate?

- A. They are liquid
- B. They are standardised
- C. They carry significant default risk

3. Which of the following statements about futures and the clearinghouse is least accurate? The clearinghouse:

- A. has defaulted on one-half of one percent of futures trades.
- B. requires the daily settlement of all margin accounts.
- C. guarantees that traders in the futures market will honor their obligations.

4. If the margin balance in a futures account with a long position goes below the maintenance margin amount:

- A. a deposit is required to return the account margin to the initial margin level.
- B. a deposit is required which will bring the account to the maintenance margin level.
- C. a margin deposit equal to the maintenance margin is required within two business days.

5. Which of the following relationships between arbitrage and market efficiency is least accurate?

- A. Investors acting on arbitrage opportunities help keep markets efficient.
- B. Market efficiency refers to the low cost of trading derivatives because of the lower expense to traders.
- C. The concept of rationally priced financial instruments preventing arbitrage opportunities is the basis behind the no-arbitrage principle.

6. A 4 percent Treasury bond has 2.5 years to maturity. Spot rates are as follows:

6 month	1 year	1.5 years	2 years	2.5 years
2%	2.5%	3%	4%	6%

The note is currently selling for \$976. Determine the arbitrage profit, if any, that is possible.

- A. \$19.22.
- B. \$37.63.
- C. \$43.22.

7. An analyst determines that a portfolio with a 35% weight in Investment P and a 65% weight in Investment Q will have a standard deviation of returns equal to zero.

- Investment P has an expected return of 8%.
- Investment Q has a standard deviation of returns of 7.1% and a
- covariance with the market of 0.0029. The risk-free rate is 5% and the market risk premium is 7%.

If no arbitrage opportunities are available, the expected rate of return on the combined portfolio is *closest to*:

- A. 6%.
- B. 7%.
- C. 5%.

8. MBT Corporation recently announced a 15% increase in earnings per share (EPS) over the previous period. The consensus expectation of financial analysts had been an increase in EPS of 10%. After the earnings announcement the value of MBT common stock increased each day for the next five trading days, as analysts and investors gradually reacted to the better than expected news. This gradual change in the value of the stock is an example of:

- A. speculation.
- B. efficient markets.
- C. inefficient markets.

9. Derivatives are often criticized by investors with limited knowledge of complex financial securities. A common criticism of derivatives is that they:

- A. increase investor transactions costs.
- B. shift risk among market participants.
- C. can be likened to gambling.

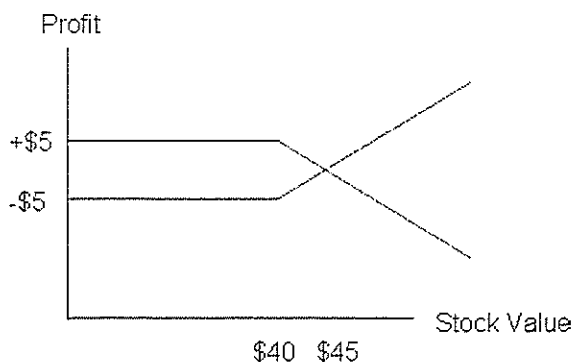
10. Using put-call parity, it can be shown that a synthetic European put can be created by a portfolio that is:

- A. short the stock, long the call, and long a pure discount bond that pays the exercise price at option expiration.
- B. short the stock, long the call, and short a pure discount bond that pays the exercise price at option expiration.
- C. long the stock, short the call, and short a pure discount bond that pays the exercise price at option expiration.

11. An investor buys a call option that has an option premium of \$5 and a strike price of \$22.50. The current market price of the stock is \$25.75. At expiration, the value of the stock is \$23.00. The net profit/loss of the call position is *closest* to:

- A. -\$5.00.
- B. \$4.50.
- C. -\$4.50.

12. Given the profit and loss diagram of two options at expiration shown below which of the following statements is *most* accurate?



- A. The stock price would have to increase above \$45 before the seller of the call starts losing money.
- B. Between a stock price of \$40 and \$45 the long call's profit is between \$0 and \$5.

C. The maximum profit to the short put is \$5.

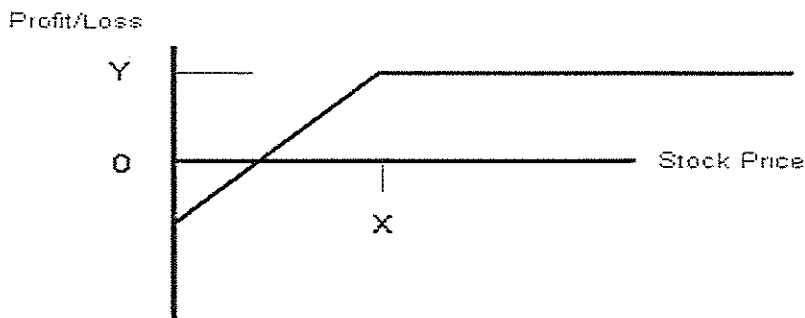
13. An investor buys 5 calls on Stock XYZ with a strike price of \$10 for a price of \$1 per call. Three months later, Stock XYZ is trading for \$15 per share. Each call entitles the owner to buy 2 shares of Stock XYZ. What is the investor's net profit?

- A. \$45.
- B. \$20.
- C. \$0.

14. An investor purchases a stock for \$40 a share and simultaneously sells a call option on the stock with an exercise price of \$42 for a premium of \$3/share. Ignoring dividends and transactions cost, what is the maximum profit that the writer of this covered call can earn if the position is held to expiration?

- A. \$3.
- B. \$2.
- C. \$5.

15. Given the covered call option diagram below and the following information, what are the dollar values for points X and Y? The market price of the stock is \$70, the strike price of the call is \$80, and the call premium is \$5.



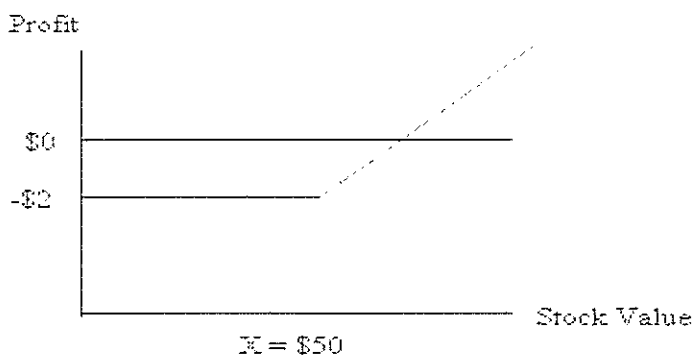
- | | <u>Point X</u> | <u>Point Y</u> |
|----|----------------|----------------|
| A. | \$75 | \$15 |
| B. | \$80 | \$5 |
| C. | \$80 | \$15 |

16. Jasper Quartermaine is interested in using the options market to create "insurance" against a severe drop in the value of a stock portfolio that he owns. How could he *best* accomplish this goal and what is this type of strategy called?

Type of option Strategy

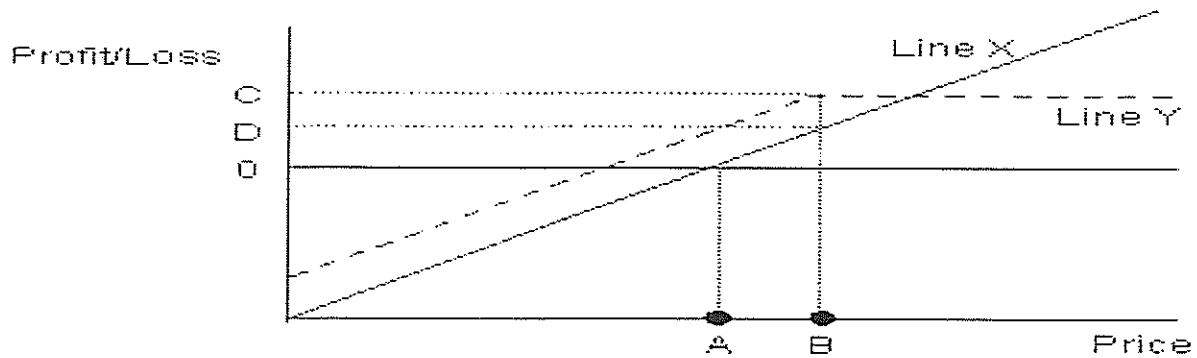
- A. write call options protective put
- B. buy put options protective put
- C. write call options covered call

17. Given the payoff diagram shown below of an option combined with a long position in a stock, which of the following statements *most* accurately describes the profit or loss potential to the holder of the combined position?



- A. The maximum profit on the short put is \$2.
- B. The maximum loss on the long put is its cost.
- C. The maximum profit on the long call is unlimited.

18. Donner Foliette holds stock in Hamilton Properties, which is currently trading at \$25.70 per share. On the advice of this investment advisor, he conducts a covered call transaction at a strike price of \$30 and at a premium of \$3.50. The advisor drew the following graph to help explain the transaction.



Which of the following statements about this transaction is *least* accurate?

- A. The call buyer paid \$3.50 for the right to any gain above \$30.
- B. If the stock price falls to \$23, Foliette will gain \$0.80 per share.
- C. Foliette believes the stock will appreciate significantly in the near future.

19. A stock is trading at \$18 per share. An investor believes that the stock will move either up or down. He buys a call option on the stock with an exercise price of \$20. He also buys two put options on the same stock each with an exercise price of \$25. The call option costs \$2 and the put options cost \$9 each. The stock falls to \$17 per share at the expiration date and the investor closes his entire position. The investor's net gain or loss is:

- A. \$4 loss.
- B. \$3 loss.
- C. \$4 gain.

20. George Mote owns stock in IBM currently valued at \$112 per share. Mote writes a call option on IBM with an exercise price of \$120. The call option is sold for \$1.80. At expiration, the price of IBM is \$115. What is Mote's profit (or loss) from his covered call strategy? Mote:

- A. gained 4.80.
- B. gained 3.00.
- C. lost 3.20.

21. An investor buys a share of stock at \$33 and simultaneously writes a 35 call for a

premium of \$3. What is the maximum gain and loss?

Maximum Gain Maximum Loss

- A. \$2 \$35
- B. unlimited \$33
- C. \$5 \$30

22. Suppose the price of a share of Stock A is \$100. A European call option that matures one month from now has a premium of \$8, and an exercise price of \$100. Ignoring commissions and the time value of money, the holder of the call option will earn a profit if the price of the share one month from now:

- A. increases to \$106.
- B. decreases to \$90.
- C. increases to \$110.

23. Shigeo Kishiro recently purchased an American put option and Lendon Grey recently wrote an American call option on the same underlying stock, Tackel Sports (currently trading at \$40 per share). Kishiro paid \$2.75 for an exercise price of \$38.00 and Grey received \$3.75 for a strike price of \$42. Assume that there are no transaction costs to exercise. Which of the following statements about the investors is *least accurate*?

- A. Kishiro's maximum gain is the strike price minus the premium.
- B. Grey's maximum loss is unlimited.
- C. Grey's maximum gain and Kishiro's maximum loss sum to zero.

24. In June, Todd Puckett bought stock in SBC Communications for \$30 per share. At that time, Puckett sold an equivalent number of call options on SBC with an exercise price of \$35 for \$2.75. In September, at expiration, the stock is trading at \$26. What is Puckett's profit per share from his covered call strategy? Puckett:

- A. gained \$4.00.
- B. gained \$1.25.
- C. lost \$1.25.

25. An investor buys a 30 put on a share of stock for a premium of \$7 and simultaneously buys a share of stock for \$26. The breakeven price on the position and the maximum gain on the position are:

	Breakeven	Maximum gain
A.	\$21	\$11
B.	\$37	\$11
C.	\$33	unlimited

SECTION B

1. With reference to South Africa, discuss the impact of the derivative market on financial sector development and economic growth. [15 Marks]
 2. Describe the difference between futures and forwards [10 Marks]
 3. (a) Most theories of futures prices seek to explain the price difference $f(t, T) - p(t)$ or the basis. Critically discuss this statement with reference to the following theories of futures pricing:
 - (i). Net Cost of Carry
 - (ii). Expectations
 - (iii). Normal Backwardation [15 Marks]
 - b) A forward contract covering a \$10 million face value of T-bills that will have 100 days to maturity at contract settlement is priced at 1.96 on a discount yield basis. Compute the dollar amount the long must pay at settlement for the T-bills. [3 Marks]
 - c) Consider an FRA that:
 - Expires/settles in 30 days
 - Is based on a notional principal amount of \$1 million.
 - Is based on 90-day LIBOR.
 - Specifies a forward rate of 5%
- Assume that the actual 90-day LIBOR 30-days from now (at expiration) is 6%. Compute the cash settlement payment at expiration, and identify which party makes the payment. [7 Marks]

Section C

4. Describe the Black-Scholes option valuation model, and critically discuss the practical use of the model with regard to the likelihood of its assumptions being violated in the real world. [25 marks]
5. (a). Explain the put-call parity condition and explain how put-call parity is related to arbitrage and the construction of synthetic options. [15 Marks]
- (b). Discuss and illustrate the relationships between the minimum and maximum values of European and American options. [5 Marks]
- (c). Suppose that the current stock price is R52 and the risk-free rate is 5%. You have found a quote for a 3-month put option with an exercise price of R50. The put price is R1.50, but due to light trading in the call options, there was not a listed quote for the 3-month, R50 call. Estimate the price of the 3-month call option. [5 Marks]

SECTION D

6. (a). Bailey (2005:423) remarks that there is no intrinsic need to justify the existence of contracts that lead to particular payoff patterns- the parties to swap negotiate these agreements because they perceive that it is in their interests to do so. Based on this statement, given that there are two companies, Company A and Company B and suppose Company A can borrow at a floating rate equal to prime plus 1 per cent or a fixed rate of 10 per cent. Company B can borrow at a floating rate of prime plus 2 per cent or at a fixed rate of 9,5 per cent. Company A desires a fixed-rate loan while Company B desires a floating-rate loan. Using this example, illustrate and explain how the principle of comparative advantage can be used to justify the existence of swap agreements. [25 Marks]
7. (i) Bank A enters into a \$1 000 000.00 quarterly-pay plain vanilla interest rate swap as the fixed-rate payer at a fixed rate of 6% based on 360-day year. The floating-rate payer agrees to pay 90-day LIBOR plus a 1% margin; 90-day LIBOR is currently 4%.

90-day LIBOR rates are: 4.5% 90 days from now
5.0% 180 days from now
5.5% 270 days from now
6.0% 360 days from now

Calculate the amount Bank A pays or receives 90, 270 and 360 days from now.

[7 marks]

(ii). Ms Smith enters into a 2-year \$10 million quarterly swap as the fixed payer and will receive the index return on the S&P 500. The fixed rate is 8%, and the index is currently at 986. At the end of the next three quarters, the index level is: 1030, 968, and 989.

Calculate the net payment for each of the next three quarters and identify the direction of the payment.

[3 Marks]

(iii). Consider a bank. Its deposits represent liabilities and are most likely short term in nature. In other words, deposits represent floating-rate liabilities. The bank assets are primarily loans. Most loans carry fixed rates of interest. The bank assets are fixed-rate and bank liabilities are floating. Explain the nature of the interest rate risk that the bank faces, and describe how an interest rate swap maybe used to hedge this risk.

[10 Marks]

(iv). Describe the characteristics of swap contracts and explain how swaps are terminated.

[5 marks]