



THE UNIVERSITY
OF QUEENSLAND
AUSTRALIA

This exam paper must not be removed from the venue

Venue _____

Seat Number _____

Student Number

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Family Name _____

First Name _____

School of Business

EXAMINATION

Semester Two Mid-Semester Examinations, 2017

FINM3405 Derivatives and Risk Management

This paper is for St Lucia Campus students.

Examination Duration: 90 minutes

Reading Time: 10 minutes

Exam Conditions:

This is a School Examination

This is a Closed Book Examination - specified materials permitted

During reading time - write only on the rough paper provided

This examination paper will NOT be released to the Library

Materials Permitted In The Exam Venue:

(No electronic aids are permitted e.g. laptops, phones)

Calculators - Casio FX82 series or UQ approved (labelled)

Materials To Be Supplied To Students:

1 x Multiple Choice Answer Sheet

Instructions To Students:

Additional exam materials (eg. answer booklets, rough paper) will be provided upon request.

Answer Section A on the MCQ answer sheet provided.

Answer Section B in the space provided in this question booklet. In Section B, show all working/calculations so that partial marks may be awarded where warranted.

For Examiner Use Only

Question	Mark
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[illegible]

Total

Note: The followings are some midterm exam questions extracted from 2017. I am 99.9% confident that you won't be seeing them in this year's midterm exam! The purpose of this document is to give you an idea on how the questions in this year's midterm exam is structured.

MCQs

ADVICE: Spend around two minutes per question

1. The fair price of a 2-month forward contract written on gold, *excluding* storage cost, is \$1200. All else being equal, the fair price of the 2-month forward contract written on the same underlying asset (i.e., gold), *including* storage cost, is likely to be _____
 - a) Less than \$1200
 - b) Equal to \$1200
 - c) Greater than \$1200
2. Your stock portfolio has a beta of 1.30 and is currently worth \$20m. The S&P/ASX200 index is currently priced at 3540. The December-2009 maturity SPI200 futures contract is quoted at 3560. How many SPI200 futures contracts are required to fully hedge your stock portfolio? Round your answer to the nearest whole number.
 - a) 292 contracts
 - b) 225 contracts
 - c) 7344 contracts
 - d) 294 contracts
 - e) 7303 contracts
3. A stock is currently priced at \$40. The risk-free rate of interest is 8% p.a. compounded continuously and an 18-month maturity forward contract is currently traded in the market at \$43. You suspect an arbitrage opportunity exists. Which one of the following transactions do you need to undertake at time $t = 0$ to arbitrage based on the given information?
 - a) Long the forward, borrow money and buy the share
 - b) Short the forward, short-sell the share and invest at risk-free rate
 - c) Long the forward, short-sell the share and invest at risk-free rate
 - d) Short the forward, borrow money and buy the share
4. When a European put is priced higher than its upper bound, you can arbitrage by devising a trading strategy that consists of _____
 - a) Writing the European put
 - b) Writing the corresponding European call and investing the proceeds at a risk-free interest rate
 - c) Writing the European put and investing the proceeds at a risk-free interest rate
 - d) Holding the European put and borrowing at a risk-free interest rate

5. Elizabeth intends to use the Hang Seng Index (HSI) futures to hedge her portfolio. Which of the followings is her **least** concern with respect to using the HSI futures contract?
- a) Expiry of the futures contract
 - b) Current level of Hang Seng Index
 - c) Systematic risk of her portfolio
 - d) Volatility of the stock market
 - e) Risk-free rate
6. We can use stocks and/or zero coupon bonds to replicate the payoff of _____ (choose the best answer from the list below).
- a) A call option
 - b) A put option
 - c) A forward contract
 - d) Options, forward and a wide range of derivatives.
7. The current spot exchange rate is AUD 1.00 = USD 0.80. The Australian risk-free rate is 3.0% p.a. compounded continuously, whereas the US risk-free rate is 0.8% p.a. compounded continuously. The no-arbitrage price on a 9-month forward contract written on the exchange rate is likely to be _____
- a) USD 0.813 / AUD
 - b) AUD 0.787 / USD
 - c) AUD 1.271 / USD
 - d) AUD 1.230 / USD
8. A portfolio manager intends to buy some stocks next month and wishes to hedge against share price risk. Which of the followings provides the best hedge against this risk?
- a) Short futures on the stocks
 - b) Long futures on the stocks
 - c) Buy put options on the stocks
 - d) Sell call options on the stocks
9. You believe that the *yield* for 90-day bank bills is about to *fall*, and you plan to *speculate* on your prediction using interest rate *options* on 90-day bank bills. Which of the following option positions will you enter?
- a) Long a call option on 90-day bank bills
 - b) Long a put option on 90-day bank bills
 - c) Short a call option on 90-day bank bills
 - d) Short a put option on 90-day bank bills

10. The fair price of a forward contract is GBP 0.46 for 1 SGD (Singapore dollar), whereas the traded forward price for the contract is GBP 0.40 for 1 SGD. With this in mind, which one of the followings will most likely yield an arbitrage profit?

- a) Invest in a U.K. bank and borrow from a Singaporean bank
- b) Invest in a Singaporean bank and borrow from a U.K. bank
- c) Invest in both Singaporean and UK banks
- d) Borrow from both Singaporean and UK banks

Problem-solving question

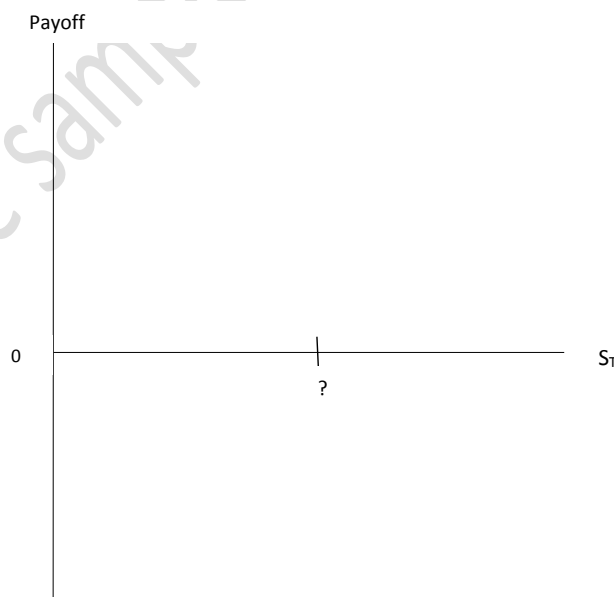
A stock is currently traded in the market at \$20. Shareholders are expected to receive dividends of \$0.80 per share 2 months from today, \$1.00 per share 8 months from today, and \$1.50 per share 14 months from today.

A 'unique' derivative is written on the stock with the following characteristics:

- The payoff of the derivative is equal to $100[22 - S_T]$ per contract if the derivative ends in-the-money on terminal date **and** zero otherwise.
- Volatility (σ) of the stock returns is 25% p.a.
- Maturity of the derivative is 9 months
- The derivative can only be exercised on maturity date.

The risk-free rate is 6% p.a. compounded continuously. Since the stock is 'cyclical' in nature (i.e., the profitability of the firm is sensitive to the business cycles), the risk premium associated with investing in the stock is 8% p.a.

- a) Use the figure below and **sketch the payoff** diagram of the derivative. Also, "?" in the figure denotes the intersection between the payoff diagram and the x-axis. Clearly state **what is the value** for "?".



- b) Calculate the current fair price of the derivative contract. Show all calculations.

Solutions to MCQs

Question 1:

C.

Explanation: It is obvious from the forward formula

Question 2:

A.

Explanation: From the formula, value to be hedged = 20mil, beta = 1.3, and value of 1 futures = 25 * 3560. Calculation will show (a) is the answer.

Question 3:

C.

Explanation: $S_0 = 40$, $r = 0.08$, $T = 18/12$. Calculation of the fair price of the forward contract shows that the market forward price of 43 is underpriced. Hence, we long the forward and to arbitrage, we would short-sell the share and invest, as per discussed in the tutorial and in the lecture.

Question 4:

Both (a) and (c) are acceptable.

Question 5:

D.

Explanation: The forward price is independent on the volatility variable.

Question 6:

D is the best answer.

Question 7:

C.

Explanation: use the forward pricing formula and you will get the answer.

Question 8:

B.

Explanation: This question should be trivial given the numerous tutorial questions that we have had. If you intend to long some stocks in the future, you should long the futures contract today.

Question 9:

A.

Explanation: Predicting a fall in the yield is analogous to predicting a rise in the price of the bill. Hence, you speculate by long the call on bank bill (you will get a positive payoff from the call when the spot price rises and exceed the strike price)

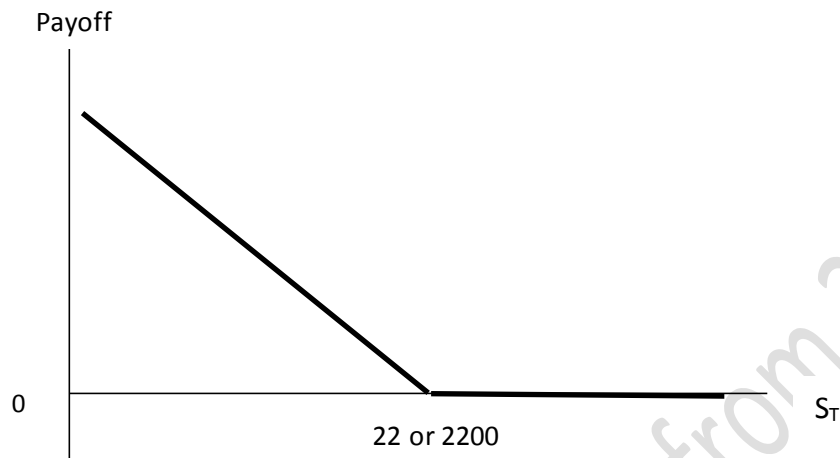
Question 10:

A

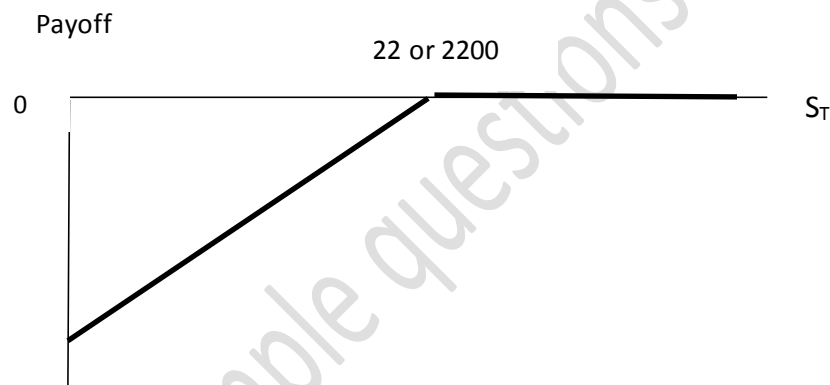
Explanation: Market forward price on SGD (priced at GBP0.40) is underpriced. Hence, you long the forward on SGD. This means you must "buy" and receive SGD in the future. This SGD receipt will be used to repay the loan in SGD. Hence, you must borrow in SGD and invest in GBP.

Solutions to problem-solving question

The question doesn't say if it is long or short the derivative. Hence, both positions are acceptable. It is obvious that the derivative is a put (carefully read the payoff description of the derivative). **Note:** Very surprisingly, some students mistaken the derivatives as a forward contract; clearly, it is not a forward contract (see the payoff description of the derivative again)!



OR



$$d_1 = \frac{\ln\left(\frac{[S_0 - PV(D)]}{X}\right) + \left(r + \frac{1}{2}\sigma^2\right)T}{\sigma\sqrt{T}}, \quad d_2 = d_1 - \sigma\sqrt{T}$$

$$C = [S_0 - PV(D)]N(d_1) - Xe^{-rT}N(d_2)$$

where $T = 9/12$

$X = 22$

$S_0 = 20$

$r = 6\%$

$\sigma = 0.25$

$PV(D) = 0.8e^{-0.06 \times 2/12} - 1.00e^{-0.06 \times 8/12}$ (the last dividend is excluded because it is after the maturity of the derivative)

Hence, put fair price = 3.44 or 344 (after multiplying with 100)