

STUDENT NUMBER:

KEELE UNIVERSITY

CLASS TEST, 2007

P3/T3 (PRINCIPAL COURSE)

Friday 23rd February, 10.00-11.00 (1 hour)

BUSINESS ECONOMICS
FINANCE
MANAGEMENT SCIENCE

Eco-30004

OPTIONS AND FUTURES

Candidates should attempt to answer **ALL** questions (**100 marks**).

The use of hand-held, battery-operated, electronic calculators will be permitted subject to the regulations governing their use which are displayed outside the examination room.

The type of calculator must be specified on the cover sheet of your answer book.

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Options and Futures ECO-30004

Candidates should attempt to answer **ALL** questions (100 marks).

1. A manufacturer buys milk from farmers.

(a) Explain what price risk the manufacturer faces. **[5 Marks]**

(b) Explain how the manufacturer can use a forward contract on milk to manage the price risk. **[5 Marks]**

Assume that the manufacturer has bought a forward contract for 5 tons of milk for delivery in 6 months. The forward contract price is $F(0,6)=£210/\text{ton}$. Assume that the spot prices are $S(0)=£205/\text{ton}$ and $S(6)=£220/\text{ton}$. The interest rate is $h(0,6)=8\%$ per annum.

(c) How big is the loss/profit of the manufacturer on the delivery date? **[5 Marks]**

(d) What is the theoretical forward price? **[10 Marks]**

(e) Identify an arbitrage opportunity; give the details of all cash flows now and at delivery. **[10 Marks]**

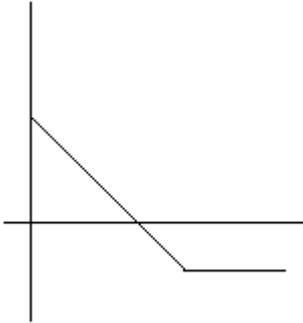
(f) Calculate the implied repo rate. **[5 Marks]**

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2. For each of the following diagrams.

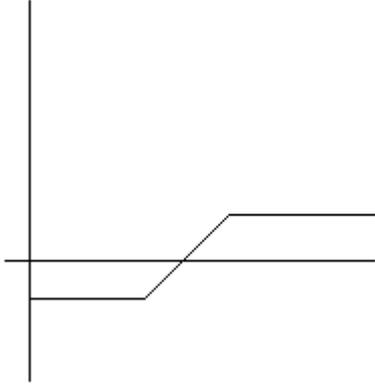
Carefully label all elements of the diagram. Discuss.

(a) Identify the combination of the option and the stock that produces the given profit diagram (you might want to draw another diagram and identify the profits for each component in the combination). **[10 marks]**



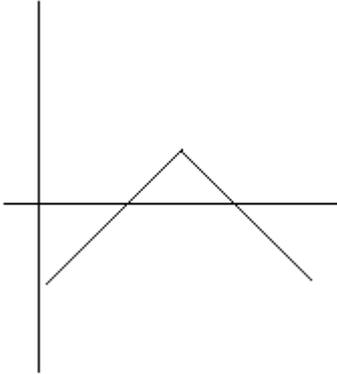
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(b) Identify the combinations of options that produce the given profit diagram (you might want to draw more diagrams and identify the profits for each component in the combination). **[10 marks]**



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(c) Identify the composition of options that produces the given profit diagram (you might want to draw another diagram and identify the profits for each component in the combination). **[10 marks]**



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3. Suppose that a stock trades at a price S such that $S = £20$. The interest rate is $r = 10\%$ per year. The stock pays no dividends. A European call with a strike price $£20$ and time to expiration of 6 months sells for $£3.5$. A European put with the same K and T sells for $£2$.
- (a) Show that the put-call parity does not hold. **[5 Marks]**
 - (b) Identify an arbitrage opportunity; give the details of all cash flows now and at expiration. **[15 Marks]**
 - (c) Now assume that the stock pays $£0.5$ dividend in 3 months time. Assume that the European put price is $£2$, $S = £20$, $K = £20$ and $r = 10\%$ per year. Using the put-call parity, calculate the price of the call option if there is no arbitrage opportunity. **[10 Marks]**

