Econ 174 Financial Insurance   Fall 2003
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Your name and Student ID:

Midterm exam

Please answer all questions. The weight of each question is given next to the question number.

1. **(25%)** Explain the reasons why you **agree** or **disagree** with the following statements. Circle the correct answer and complete the sentence.

    i.   In a margin account, the initial margin is less than the maintenance margin.

             Agree / Disagree because

    ii.   A company with large expected costs from heating its offices during the coming February can hedge its costs by taking a short position in a weather derivative contract with the following payoff: $Payoff = \$10,000 \bullet Max(0,65 - \overline{A_t})$, where $\overline{A_t}$ is the average temperature in the company's location in February of the following year.
             Agree / Disagree because

iii. The effect of a financial hedge is to replace uncertainty about the future spot price with basis risk.

Agree / disagree, because

iv. A cereal producer knows that it will need 1 million bushels of wheat three months from now. If it wants to reduce the risk associated with the future price of wheat, it should set up a long hedge in 200 wheat futures contracts (each on 5,000 bushels) expiring in three months.

Agree / disagree, because

v. The optimal hedge ratio can be estimated from historical data by regressing the level of futures prices on the level of spot prices.

Agree / disagree, because

2. **(25%)** On October 16, 2003 the spot oil price, S_0, was $31.50 per barrel. The interest rate was 1% per annum and storage costs for oil were 1% per annum.

(i)   Suppose that the October 2004 oil futures price was $27.50. Was there an arbitrage opportunity? If yes, explain the transactions involved in making a profit.

(ii)   Suppose that in fact the October 2004 oil futures price was $33. Could you make an arbitrage profit? If yes, explain the transactions involved.

(iii)   Explain what the convenience yield measures and in which of the cases (i) or (ii) there is a convenience yield associated with oil. Compute the yield for this case.

(iv)   Draw a graph showing the typical shape of the term structure of futures prices for **gold**. Briefly Explain the shape of the curve.

(v)   Can the term structure of futures prices for **stocks** ever slope downward?

3. **(25%)** Suppose company A and B encounter the following borrowing terms:

	Fixed %	Floating %
Company A	3.6	Libor + 1
Company B	4.0	Libor + 2

A wants a fixed rate loan while B wants a floating rate loan.

(i)   Is there a basis for a swap? If so, work out the terms of the swap on the assumption that the swap gains are split evenly between A and B.

(ii)   What is the key determinant of a (fixed-rate) bond's risk and how is it measured?

(iii)   What is the right strategy in the bond futures market for an investor who owns bonds and will need to sell them in the future and wants to *hedge* the risk?

(iv)   What is a sensible investment strategy for a *speculator* who thinks that interest rates are going to rise in the near future?

4. (25%) Your company 'Best Beans' expects that it will need to buy 1 million pounds of coffee beans five months from now. You are concerned that the price of coffee may go up between now (October 2003) and when you need the coffee (March 2004) and therefore consider using a coffee futures contract to set up a hedge.

(i)   Explain which uncertainty you are exposed to if you <u>don't</u> set up the hedge. Separately consider if you are better or worse off when coffee prices rise or decline.

Gain/loss if coffee prices rise (unhedged position):

Gain/loss if coffee prices decline (unhedged position):

(ii)   Each coffee futures contract is on 37,500 pounds of coffee. Explain how many March 2004 coffee futures contracts you should buy/sell to obtain the best hedge. You can assume that the correlation between spot and futures coffee prices equals one.

(iii)   Explain if it is possible that the risk of a hedged position can be higher than the risk of an unhedged position if the wrong number of futures contracts is used.

(iv)   Suppose the April coffee spot price turns out to be 75 cents per gallon whereas in October 2003 the futures price for March 2004 delivery was 64 cents per gallon. How many dollars did you lose/gain on your futures hedge in (ii)?