Homework 2

1. (*Riskless term-structures*) You observe the following term structure of yields-to-maturity on current government coupon bonds. Equivalently, these are the coupon rates on riskless bonds which trade at par (i.e. price=100% of face value) for each maturity.

maturity (years)	y-t-m
1	1.33
2	1.73
3	2.15
4	2.55
5	2.72
6	3.13
7	3.35
8	3.38
9	3.40
10	3.48

Assume that these bonds can be bought or sold short at these yields. The yields are expressed as annual-compounded, annual rates.

(a) Compute the zero-coupon term structure, and the term-structure of one-year forward rates.

(b) Compute the term-structure of fair (no arbitrage) swap rates for fixed-for-floating swaps between riskless counterparties using the riskless 1-year as the floating rate.

(c) Suppose you have an existing 9-year swap on your books of $100m at rate 4.30%. (You are the floating payor.) What is your position worth? How sensitive is its value to a 1BP move in the current 9 year swap rate?

2. (*Designing swaps*)

(a) Companies A and B have been offered the following rates per annum on a $10 million five-year loan:

	Fixed Rate	Floating Rate
Company A	12.0%	LIBOR + 0.1%
Company B	13.4%	LIBOR + 0.6%

Company A requires a floating-rate loan; company B requires a fixed-rate loan. Design a swap that will net a bank, acting as intermediary, 10 basis points per annum and appear to be equally attractive to both companies.

(b) Companies X wishes to borrow U.S. dollars at a fixed rate of interest. Company Y wishes to borrow Japanese Yen at a fixed rate of interest. The amounts required by the two companies are roughly the same at the current exchange rate. The companies have been quoted the following interest rates (annualized, simple):

	Yen	Dollars
Company X	4.0%	8.0%
Company Y	5.5%	8.4%

Design a swap that will net a bank, acting as intermediary, 50 basis points per annum. Make the swap equally attractive to the two companies and ensure that all foreign exchange risk is assumed by the bank.

3. (*Return swaps*) You are a portfolio manager and have gone bearish on the European telecom sector. You are considering implementing your opinion by engaging in a return swap in which you pay an investment bank the total returns on a benchmark portfolio of telecom stocks every quarter (on a fixed notional amount) in exchange for receiving EURIBOR plus or minus a fee f. (Assume that the stocks are all traded in euros.) When you get quotes from a few dealers, you find that they are quoting you a fee of, on average, 40 basis points (BPs). That is, they will pay you that much less than EURIBOR. To find out if they are all trying to screw you, you ask some other banks to quote the swap the other way and discover that they are willing to receive 20 basis points less than EURIBOR to pay the telecom index return. So the swap isn't being priced "flat": the mid-point is $f = -30$BP.

Can this be reconciled with the conclusion in the lecture that any return swap on two assets of equal notional amount must always be fair for NO net payment to either side? You work for a highly rated fund management company, so your credit is not part of the answer.

Note that the question is NOT asking you to explain the existence of a bid/ask spread.

4. (*T/F*) Agree or disagree with the following assertion. Explain your answer.

   Regardless of your risk preferences or your views on the market outlook, you should always be willing to enter into a return swap where you pay the returns on the S&P500 and receive the return on short-term government bonds, if you will be paid any positive fee to do so (assuming a riskless counterparty).

5. (*T/F*) Agree or disagree with the following assertion. Explain your answer.

   If you are the floating rate receivor for a LIBOR swap against paying 5% fixed and your counterparty goes bankrupt when there are two years remaining in the swap, and the current 2-year swap rate is 3% this bankruptcy creates a loss for you of at most 4 percent of the swap's notional value.