

Extra Midterm Exam Spring 2010  
"Fin 740 - Fixed Income analysis"

You have one hour and 15 min to complete the test. You are allowed to use a standard calculator and a two page formula sheet.

### Problem 1

a) A treasury bond with exactly two years to maturity, semi annual coupons, a coupon rate of 3%, has a semi annual yield-to-maturity of 2.1%. Find the price.

b) Find the price again assuming the annualized yield to maturity is 2.1%.

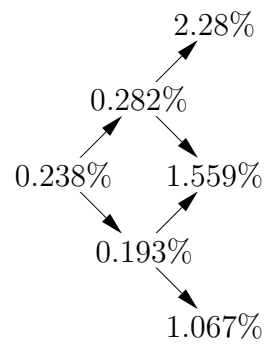
c) Consider now a bond with 4 remaining future coupon payments. These coupons will be paid in 46, 227, 408, and 589 days from now. The annual coupon rate is 3%. Find the price assuming that the semi annual ytm is 2.1%.

**d)** Find the value of the bond in c) assuming that the prices of zero coupon bonds with maturities 46, 227, 408, and 589 days are 0.9997, 0.996, 0.988, and 0.975, respectively.

**e)** Assume now that the market is trading the bond at the price you found in c). Is there an arbitrage? If so, show what to buy, sell, and tabulate the cash flows at each time such that you will pocket the arbitrage profit today.

**Problem 2**

The following tree was calibrated to the March 2010 term structure:



The risk-neutral probabilities are 50/50.

a) This is a BDT tree. Find the volatilities  $\sigma(t)$  used to construct the tree.

b) Find the price of a 1% semi annual coupon bond with 1.5 years to maturity.

c) Find the prices of zeros with 6m, 12m, and 18m maturities.

d) Use your answer in d) to find the forward rates. Specify whether you are computing semi-annual or annual forward rates.

e) Suppose the spot rate moves from 0.238 to 0.282 in the coming six months. Will forward rates change? If so, figure out how much.

f) Explain in principle how to price an option on forward rates. You can assume it has 6 month maturity.