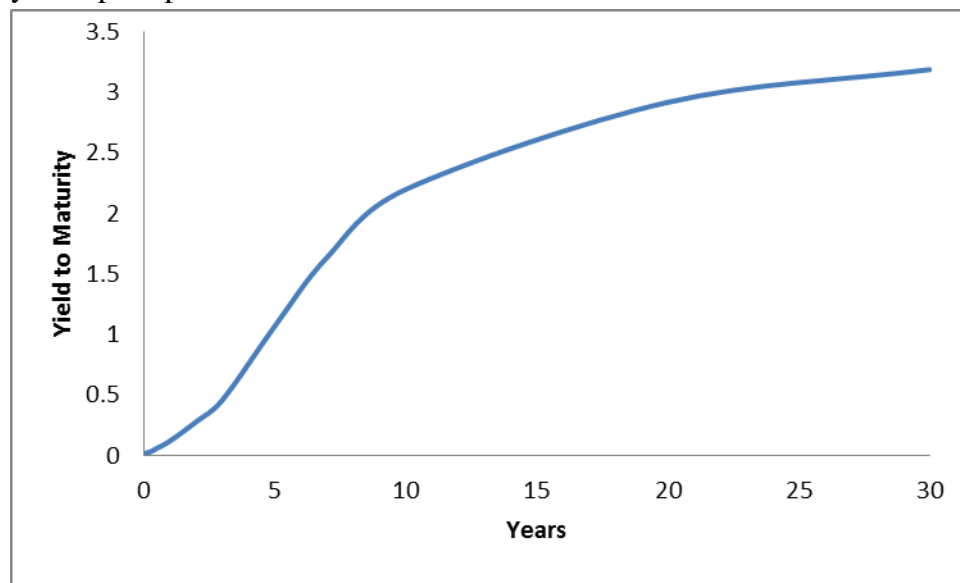


**Problem Set 5 for Economics 180.367:
Investments and Portfolio Management
Due at the beginning of class on November 4.**

Note: Point totals are shown at the beginning of each question. It is important to show your work.

1. (10 pts) Suppose that the yield on a 3-1/2 year zero-coupon bond is 4% and the yield on a four-year zero-coupon bond is 6%. What is the six month forward rate ending four years hence? All interest rates are at annual rates with semiannual compounding.
2. (30 pts) (a) On 8/15/2011, what was the price and yield of the ten-year Treasury security with 2-1/8 percent coupons maturing on 8/15/2021? Please quote the price in decimal form per \$100 face value (not in 32nds).
(b) Compute the duration, modified duration, and convexity of this security.
(c) Draw a graph plotting the price of this security against the yield. Do this by computing the price when the yield to maturity is from 1 to 5 percent in increments of 10 basis points.
3. (10 pts) A 3% perpetuity is issued with a yield-to-maturity of 3%. The coupons are paid semiannually and the issue price of the perpetuity is \$100. The price of this security then falls to \$80. After the price drop, what is the duration of this perpetuity?
4. (10 pts) (a) The graph below shows the Treasury yield curve on October 24, 2011. Give two reasons why it slopes up.



(b) On October 24, 2011, the difference between the three-month and ten-year Treasury yields was 2.17 percent. Find the average slope of the yield curve (difference between the three-month and ten-year yields) from January 1982 to September 2011. Use monthly data on three-month and ten-year constant maturity yields, which you can obtain from:

<http://www.federalreserve.gov/releases/h15/data.htm>

5. (20 pts) The interest rate is 7% (annual compounding). A pension fund has a liability will owe \$10,000 per year in 9 years time.

(a) What is the present value of this liability?

(b) You are hired by the pension fund to construct an immunizing portfolio that matches the present value and duration of the liability. This portfolio will consist of one-year and thirty-year STRIPS. What will you put in the immunizing portfolio?

6. (10 pts) The five-year CDS spread on Risky Corp is 200 basis points.

(a) What annual payment does a buyer of credit protection have to pay to insure \$1 million of Risky Corp bonds?

(b) In the event of default, the recovery rate is 40%. If investors are risk neutral, what is the probability of default per year over the next five years?

7. (10 pts). Draw a graph of the ten-year Treasury yield and the ten-year swap rate since January 2006. Why is the swap rate normally above the Treasury yield? Give one reason why the swap rate was below the Treasury yield in 2010?