1. (6 points) Compute the interest rates.

   (a) Determine the current yield on a $1,000 face value, 10% coupon bond selling for $900 (2 points).

   \[ i_c = \frac{C}{P} \]
   \[ = \frac{1000 \times 10\%}{900} \]
   \[ = 11.1\% \]

   (b) What is the yield to maturity on a $1,000 face value discount bond maturing in TWO years and selling for a price of $800? (2 points)

   \[ 800 = \frac{1000}{(1 + i)^2} \]
   \[ \Rightarrow i = 11.8\% \]

   (c) Would it ever make sense to pay $1100 for a coupon bond with a face value of $1000? Briefly explain.

   Yes, it make sense to pay above par when the coupon rate is higher than the yield to maturity.
2. (10 points) Predict the effect on the interest rate of the following events using EITHER the bond supply and demand analysis OR liquidity preference framework.

(a) The Congress has passed a bill eliminating the tax on capital gains from holding stocks (3 points);

Stocks will be relatively more attractive, and as a result, the demand for bond decreases. Bond prices will decrease and interest rates will increase.

(b) Hurricanes Katrina and Rita destroyed bridges and roads in Louisiana, Mississippi and Texas, leading to increased investment spending for rebuilding the infrastructure (3 points)

Higher investment spending requires more funds raised through the bond market, as a result, bond supply will increase, bond price will decrease, and interest rates will increase.

(c) Fear of inflation as energy costs rise (4 points).

An increase in expected inflation increases bond supply and reduces bond demand, as a result, bond price will decrease, and interest rates will increase. We call this Fisher effect.

3. (8 points) Compute the rate of returns. (Hint: Calculate the initial price and end-of-period price first, then calculate the return.)

(a) Suppose you purchase a consol with a yearly payment of $100 at the beginning of the year when the yield to maturity is 10%. Calculate the rate of return on the consol for the year, if at the end of the year the yield to maturity unexpectedly rises to 20%.

Denote the price of consol and the yield to maturity at the beginning of the year respectively as \( P_t \) and \( i_t \), and denote the annual coupon payment as \( C \) :(1 point)

\[
P_t = \frac{C}{i_t}
= \frac{100}{0.1}
= 1000
\]
Denote the price of consol and the yield to maturity at the end of the year respectively as $P_{t+1}$ and $i_{t+1}$, and denote the annual coupon payment as $C$ : (1 point)

$$P_{t+1} = \frac{C}{i_{t+1}} = \frac{100}{0.20} = 500$$

The return for the year, $R_{t+1}$, can be written as (1 point)

$$R_{t+1} = \frac{C}{P_t} + \frac{P_{t+1} - P_t}{P_t} = \frac{100}{1000} + \frac{500 - 1000}{1000} = -40\%$$

(b) Suppose you purchase a coupon bond, with a face value of $1000$, a coupon rate of 10%, and 3 years to maturity, at the beginning of the year when the yield to maturity is 10%. Calculate the rate of return on the bond for the year, if at the end of the year the yield to maturity unexpectedly rises to 20%.

The price of the coupon bond at the beginning of the year, $P_t$, is equal to its face value, 1000. (1 point)

Denote the price of the coupon bond and the yield to maturity at the end of the year respectively as $P_{t+1}$ and $i_{t+1}$, and denote the annual coupon payment as $C$. Note that at the end of the year, the coupon bond will mature in another two years. We compute $P_{t+1}$ as the present value of the annual coupon payments and principal
due at maturity. (2 point)

\[ P_{t+1} = \frac{C}{(1 + i_{t+1})} + \frac{C}{(1 + i_{t+1})^2} + \frac{F}{(1 + i_{t+1})^2} \]

\[ = \frac{100}{1 + 0.20} + \frac{100}{(1 + 0.20)^2} + \frac{1000}{(1 + 0.20)^2} \]

\[ \approx 847 \]

The return for the year, \( R_{t+1} \), can be written as (1 point)

\[ R_{t+1} = \frac{C_{t+1} - P_t}{P_t} \]

\[ = \frac{100}{1000} + \frac{847 - 1000}{1000} \]

\[ = -5.3\% \]

(c) What explains the differences between the rate of returns in (a) and (b). (1 points)

In (a) and (b), the term to maturity is higher than the holding period. In this case, the longer the maturity, the larger will be the capital loss resulting from a sudden increase in the interest rate.

4. (12 points) Describe the response over time of the interest rate to an unexpected decrease in the growth rate of the money supply when the liquidity effect is small and expected inflation is slow to adjust.

A sudden decrease in the money growth rate leads to scarce liquidity in the economy. When there is still not enough time for money demand to adjust, the liquidity effect operates quickly to raise the interest rate. But as time goes by, income decreases, price level decreases, and people start to adjust their inflation expectation downward. According to Fisher effect, the decrease in expected inflation leads to a decrease in the interest rate. The income and price effects also reduce money demand and push the interest rate down. These three effects combined reverse the initial increase in the interest rate. Because the
liquidity effect is small, the interest rate eventually declines to lower than its initial level. (4 points respectively for description of liquidity effect and expected inflation effect, 1 point each for income and price effect). This episode resembles what happened in the late 70s and early 80s when the Federal Reserve governor, Paul Volker, implemented tight monetary policy to combat inflation (2 points).

5. (2 points) List two reasons why an expectation may fail to be rational.

An expectation may fail to be rational if (a) The prediction is not optimal; (b) The prediction is made without using all available information.

6. (4 points)

(a) Predict what will happen to interest rates on municipal bonds issued by hurricane-ravaged states along the gulf coast if the federal government guarantees a bailout of those municipal bondholders in case of bankruptcy? (2 points)

If the federal government promises a bailout, municipal bonds will become less risky. As a result, the demand for municipal bonds will increase, their bond prices will increase, and the interest rate on the municipal bonds will decrease.

(b) Treasury Secretary John Snow told Congress that the Bush administration opposes such a bailout. He said, "A federal bailout in the form of Treasury guaranteeing municipal securities could result in a risk premium in Treasury issuance going forward." Please explain the economic reasoning behind Secretary Snow’s statement. (2 points)

A federal bailout adds the liability of the federal government, and reduces the attractiveness of Treasury bonds. Such a policy will decrease the demand for Treasury bonds, reduce their prices, and raise the interest rate at which the federal government borrows from the public.

7. (8 points) Data observations show that the yield curve is likely to be downward sloping at the start of recessions. Explain these observations
using the bond supply and demand analysis and expectation hypothesis theory.

First we need to show that the interest rate is procyclical, that is, it decreases during recessions. According to the bond demand and supply analysis, when the economy is heading toward recession, there will be fewer profitable investment opportunities. As a result, there will be a decline in the supply of bonds. In the meantime, a decrease in income and wealth during recessions also reduces the demand for bonds. It has often been the case that the decline in bond supply dominates that in bond demand, and as a result, bond price goes up, and the interest rate goes down in recessions. (4 points)

According to the expectation hypothesis, the long term interest rate is an average of expected future short term interest rates. If people expect the interest rate to go down in the coming recessions, the yield curve will be sloping downward. (4 points)