Problem Set I
Answers

Problems from the textbook:

Chapter 1:

9. The interest rate on three-month Treasury bills fluctuates more than the other interest rates and is lower on average. The interest rate on Baa corporate bonds is higher on average than the other interest rates.

11. Higher stock prices means that consumers' wealth is higher and so they will be more likely to increase their spending.

Chapter 2:

2. Yes, I should take out the loan, because I will be better off as a result of doing so. My interest payment will be $4,500 (90% of $5,000), but as a result, I will earn an additional $10,000, so I will be ahead of the game by $5,500. Since Larry's loan-sharking business can make some people better off, as in this example, loan sharking may have social benefits. (One argument against legalizing loan sharking, however, is that it is frequently a violent activity.)

4. The principal debt instruments used were foreign bonds, which were sold in Britain and denominated in pounds. The British gained because they were able to earn higher interest rates as a result of lending to Americans, while the Americans gained because they now had access to capital to start up profitable businesses such as railroads.

8. I will leave this to you – it’s *your* personal experience!

10. They might not work hard enough while you are not looking or may steal or commit fraud.

12. True. If there are no information or transactions costs, people could make loans to each other at no cost and would thus have no need for financial intermediaries.

Chapter 3:

5. Wine is more difficult to transport than gold and is also more perishable. Gold is thus a better store of value than wine and also leads to lower transactions cost. It is therefore a better candidate for use as money.
8. The ranking is (a) and (c) the most liquid; then, in descending order of liquidity, (e), (f), (b), and (d).

10. Because of the rapid inflation in Brazil, the domestic currency, the real, is a poor store of value. Thus many people would rather hold dollars, which are a better store of value, and use them in their daily shopping.

14. The highest weight would be assigned to currency and NOW accounts, because they are the most liquid (have the greatest degree of "moneyness"). Savings account deposits and U.S. Savings Bonds would receive lower weight because they are somewhat less liquid, while houses and furniture would receive the lowest weights, because they are the most illiquid.

Chapter 4:

4. The yield to maturity is less than 10 percent. Only if the interest rate was less than 10 percent would the present value of the payments add up to $4,000, which is more than the $3,000 present value in the previous problem.

6. \[25\% = \frac{\$1,000 - \$800}{\$800} = \frac{\$200}{\$800} = .25.\]

8. If the interest rate was 12 percent, the present discounted value of the payments on the government loan are necessarily less than the $1,000 loan amount because they do not start for two years. Thus the yield to maturity must be lower than 12 percent in order for the present discounted value of these payments to add up to $1,000.
Solutions to additional problems

1. Price level = P  
   Real value of money = \( \frac{1}{P} \) goods  
   If price level changes from \( P_1 \) to \( P_2 \), the real value of money changes from \( \frac{1}{P_1} \) to \( \frac{1}{P_2} \). Then, the gross real return on money is 
   \[
   \frac{\text{Final real value}}{\text{Initial real value}} = \frac{\frac{1}{P_2}}{\frac{1}{P_1}} = \frac{P_1}{P_2}
   \]
   Hence, if price level rises by 10% i.e., \( \frac{P_2}{P_1} = 1.1 \), Gross return \( \frac{P_1}{P_2} = \frac{1}{1.1} \) = 0.91. Net return is 
   \[
   \frac{\text{Final real value} - \text{Initial real value}}{\text{Initial real value}} = \frac{P_1}{P_2} - 1 = 0.91 - 1 = -0.09
   \]
   Ans: Gross real return: 91%, Net real return: 9%.

2. Number of relative price tags in a barter economy give \( n \) number of goods: 
   \[
   = \frac{n(n-1)}{2}
   \]
   Here \( n = 10 \). Hence, number of price tags = \( \frac{10 \times 9}{2} = 45 \)
   Ans: 45

3. Since Bank A compounds annually, the rate \( i_A = 0.08 \) is already the effective annual rate. For Bank B, we have to convert. The microperiod here is a month, so we first need the monthly rate 
   \[
   i_{B,\text{monthly}} = \frac{0.079}{12} = 0.00658
   \]
   Now we compound monthly to get the effective annual rate, call it \( i_B \). This is given by the future value of one dollar at the end of the year, minus one 
   \[
   i_B = (1 + i_{B,\text{monthly}})^{12} - 1 = (1 + 0.00658)^{12} - 1 = 0.819
   \]
   Ans: 8.19% (Here is a message: frequent compounding can make seemingly smaller APR loan have a larger effective interest rate. Beware.)

4. This is an annuity problem.  
   Part a. The number of periods is \( n = 300 \) with a \( PV = 100,000 \). We have an annual interest rate of 16%, so the monthly rate is \( i = \frac{0.16}{12} = 0.0133 \). We are looking for the payment 
   \[
   pmt = \frac{PV * i}{1 - (1 + i)^{-n}} = \frac{100,000 * 0.0133}{1 - (1 + 0.0133)^{-360}} = 1356
   \]
Part b. Again \( n = 300 \) and \( i = 0.0133 \). But now the payment \( pmt = 1000 \) is given and we are looking for the present value

\[
PV = \frac{pmt}{i} \left( 1 - \frac{1}{(1 + i)^n} \right) = \frac{1000}{0.0133} \left( 1 - (1 + 0.0133)^{-300} \right) = 73,590
\]

Part c. Now \( PV = 100,000 \) and \( pmt = 1500 \) are fixed. We want the number of periods:

\[
n = \frac{-\ln \left( 1 - \frac{PV 	imes i}{pmt} \right)}{\ln (1 + i)} = 164.8
\]

This is not an integer; so the 165th payment is not completely needed.

5.

Part a. YTM is the interest rate at which the price of bond equals its present value

\[
P = \frac{FV}{(1 + i)^n}
\]

\( FV = 1000 \) and \( P = 800 \) imply that

\[
i = \left( \frac{FV}{P} \right)^{\frac{1}{n}} - 1 = \left( \frac{1000}{800} \right)^{\frac{1}{5}} - 1 = 0.0456
\]

Hence, its yield to maturity is 4.56%.
This is smaller than the 5% yield offered in option (b). Hence, choose (b).

6.

For bond in (a)

Face value = 10,000; C.R = 10%. Hence, coupon payment \( C = 10000 \times 0.1 = 1000 \)

The offered cash flow is:

1000 coupon payment after 1 year, and 1000 coupon payment plus 10000 Face Value payment after 2 years. At any interest rate \( i \), its present value is

\[
PV = \frac{1000}{(1 + i)} + \frac{1000}{(1 + i)^2} + \frac{10000}{(1 + i)^2}
\]

One way to compare (a) with (b) is to calculate \( i \) (YTM) for bond by substituting its price (9500) for \( PV \) in the above equation, and then compare this \( i \) with 9% in (b). But, that would require Financial calculator, and I don’t want you to use them for now. I prefer you to work it out another way:

Use 9% interest rate in (b) to calculate the present value of bond’s cash flows in (a)

\[
PV_{at \ 9\%} = \frac{1000}{(1 + 0.09)} + \frac{1000}{(1 + 0.09)^2} + \frac{10000}{(1 + 0.09)^2} = 10176
\]

Since bond’s present value at 9% at 10176 is higher than its price 9500, it must be the case that its yield to maturity is higher than 9% (remember always: price and yield are inversely related).
Hence, prefer (a).