12.

The current yield curve for default-free zero-coupon bonds is as follows:

Years to Maturity	YTM
1	10%
2	11%
3	12%

a) What are the implied one-year forward rates?

Obtain forward rates from the following table:

Maturity (Years)	YTM	Forward Rate	Price
1	10%		909.09
2	11%	12.01%	811.62
3	12%	14.03%	711.78

b) Assume the pure expectations hypothesis is correct. If market expectations are correct, what will the yield curve on one- and two-year zero-coupon bonds be next year?

Maturity (Years)	Price	YTM
1	1000/1.1201	12.01%
2	1000/[1.1201*1.1403]	13.02%

c) If you purchase a two-year zero-coupon bond now, what is the expected total rate of return over the next year? What if you purchase a three-year zero-coupon bond?

Next year, the 2-year zero will be a 1 year zero, and will sell at 892.78; likewise, the 3-year zero will be a 2-year zero trading at 782.93.

Expected total rate of return:

2-Year: (892.78/811.62) – 1 = 10%

3-Year: (782.93/711.78) – 1 = 10%

d) What should be the current price of a three-year maturity bond with a 12% coupon rate paid annually? If you purchased it at that price, what would your total expected rate of return be over the next year?

The current price of the bond should equal the value of each payment times the present value of $1 to be received at the maturity of that payment. The PV schedule can be taken directly from the prices of zero-coupon bonds calculated above.

Current price = 120*(0.90909) + 120*(0.81162) +
+ 1120*(0.71178)
= 109.0908 + 97.3944 + 797.1936
= 1003.68

Similarly, the expected prices of zeroes in 1 year can be used to calculate the expected bond value at time:

Expected price 1 year from now:

= 120*0.89278 + 1120*0.78293 = 984.02

Total expected rate of return = $\frac{120+984.02-1003.68}{1003.68}=10\%$

14.

YTM on a one-year zero is currently 7%; on a two-year zero it is 8%. The treasury plans to issue a two year maturity bond with an annual coupon of 9%, 100 par value.

a) At what price will the bonds sell?

$$P=\frac{9}{1.07}+\frac{109}{1.08^2}=101.86$$

The YTM is 7.958.

b) If the expectations theory is correct, what is the market expectation of the price in a year's time?

Need to know the discount rate.

$$1+f_2 = \frac{1.08^2}{1.07} = 1.0901$$

Thus, with an expected short next year of 9.01% the forecast of the bond's price is:

$$p = \frac{109}{1.0901} = 99.99$$

c) What if the liquidity preference is correct and you believe there is a liquidity premium of 1%?

$$\text{Liquidity premium} = f_2 - E(r_2)$$

$$\Rightarrow E(r_2) = 8.01\%$$

The bonds should sell at 109/1.0801 = 100.92

17.

Prices on zeroes reveal the following forward rates:

Year	%
1	5
2	7
3	8

Furthermore, there exists a 3-year annual coupon bond with payments of 60 and face value of 1000.

a) What is the price of that bond?

$$P = \frac{60}{(1.05)} + \frac{60}{(1.07)} + \frac{1060}{(1.05)(1.07)(1.08)} = 984.1$$

b) What is the expected RCY of this bond under the expectations hypothesis?

$$984.1(1 + RCY)^3 = 60(1.07)(1.08) + 60(1.08) + 1060$$
$$\Rightarrow RCY = 6.66\%$$

c) You forecast the yield to be flat at 7% in one year's time. What is our forecast of the one-period HPR?

The price next year will be:

$$P_1 = \frac{60}{1.07} + \frac{1060}{(1.07)^2} = 981.92$$

Which implies a capital loss of 984.1 – 981.92 = 2.18

$$HPR = \frac{60 + (-2.18)}{984.1} = 5.88\%$$