Set 1 Questions

1. If you are given the 2-year, 3-year and 4-year spot rates, which of the following forward rates can you calculate?
   A. The one-year forward rate two years from today, the one-year forward rate three years from today and the two-year forward rate two years from today.
   B. The one-year forward rate four years from today and the two-year forward rate three years from today.
   C. The two-year forward rate three years from today and four-year forward rate one year from today.

2. The relationship between the four-year spot rate, two-year spot rate and two-year forward rate two years from now is given as:
   A. $[1 + r(2)]^2 = [1 + r(4)]^4 [1 + f(2, 2)]^2$
   B. $[1 + r(4)]^4 = [1 + r(2)]^2 [1 + f(2, 2)]^2$
   C. $[1 + r(4)]^4 = [1 + r(2)]^2 [1 + f(4, 2)]^2$

3. If one-year forward rate five years from today is 9.00%, the *least correct* interpretation of 9.00% is:
   A. the reinvestment rate that would make a buyer indifferent between investing in a six-year zero-coupon bond or buying a five-year zero-coupon bond and at maturity reinvesting the proceeds for one year.
   B. the rate that would make the investor indifferent between buying a five-year bond or buying a six-year bond.
   C. the one-year rate that can be locked in today by investing in a six-year zero-coupon bond instead of buying a five-year zero-coupon bond and at maturity, reinvesting the proceeds in a zero-coupon instrument which has one-year maturity.

4. When the yield curve is downward-sloping, the market expectation it *most likely* reflects is:
   A. falling inflation rates in the future.
   B. rising inflation rates in the future.
   C. strong economic growth in the future.

5. Which of the following statements regarding the YTM of a risk-free government bond is *most accurate*? The YTM is an appropriate measure of the expected return of the bond if the:
   A. interest rates are volatile and the bond is either puttable or callable.
   B. coupons are reinvested at the original yield to maturity and the bond is held till maturity.
   C. yield curve has a steep slope.

6. The two-year spot rate is 3.00%. The four-year spot rate is 5.00%. The forward price of a two-year bond to be issued in two years is:
   A. 0.9796.
   B. 0.8728.
   C. 0.9070.

7. If the one-year spot rate is 3.00%, two-year spot rate is 4.00% and three-year spot rate is 5.00%, then f(1,2) is
   A. greater than r(3).
   B. less than r(3).
   C. equal to r(3).

8. If the one-year par rate is 3.00% and the two-year par rate is 3.65%, then the one-year and two-year zero-coupon rates are:
   A. 3.00%; 3.65%.
   B. 3.65%; 4.05%.
   C. 3.00%; 3.66%.

9. The par curve represents the yield to maturity on:
   A. coupon-paying corporate bonds priced at par.
   B. discount bonds.
   C. coupon-paying government bonds at par.

10. Assume you have the following information: one-year spot rate is 5.00%, two-year spot rate is 6.00% and the one-year forward rate one year from today is 7.01%. If the spot rates one year from now reflect the current forward curve, the return of a two-year, zero-coupon bond over a one-year holding period will be closest to:
    A. 5.00%.
    B. 6.00%.
    C. 7.01%.

11. Assume the spot curve one year from today differs from today's forward curve. Consider the following information: one-year spot rate is 5.00%, two-year spot rate is 6.00% and the one-year forward rate one year from today is 7.01%. If the one-year spot rate one year from today is 6.00%, the return of a two-year, zero-coupon bond over a one-year holding period will be *closest* to:
    A. 5.00%.
    B. 6.00%.
    C. 7.01%.

12. A bond is undervalued if the investor's expectation about the future spot rates is:
    A. lower than the quoted forward rate.
    B. equal to the quoted forward rate.
    C. greater than the quoted forward rate.

13. If at the end of Year 1, the one-year spot rate is higher than what is implied by the current forward curve, the one-year holding period return on a two-year zero coupon bond will be:
    A. less than the one-period risk-free rate.
    B. equal to the one-period risk-free rate.
    C. more than the one-period risk-free rate.

14. If a yield curve is upward sloping and does not change level or shape, then buying a bond with the investment period shorter than its maturity would provide a total return:
    A. greater than the return on a maturity-matching strategy.
    B. equal to the return on a maturity-matching strategy.
    C. lower than the return on a maturity-matching strategy.

15. The *least* likely trade that an active bond investor would make when the yield curve is upward sloping is known as:
    A. rolling down the yield curve.
    B. riding the yield curve.
    C. the maturity-matching strategy.

16. A forward contract price will decrease if:
    A. future spot rates are equal to the current forward rates.
    B. future spot rates are higher than the current forward rates.
    C. future spot rates are lower than the current forward rates.

17. The swap rate reflects the:
    A. floating-rate leg of an interest rate swap.
    B. fixed-rate leg of an interest rate swap.
    C. average of the floating-rate and fixed-rate legs of an interest rate swap.

18. The *least likely* reason that the swap market is highly liquid is:
    A. due to counterparties making the swap contracts flexible and customized.
    B. due to multiple borrowers or lenders.
    C. due to providing the most efficient method of hedging interest rate risk.

19. If a sovereign par curve implies a one-year discount factor of 0.9615, and a two-year factor of 0.9070, then the swap rate at time T = 1 is *closest* to:
    A. 3.50%.
    B. 5.00%.
    C. 4.00%.

20. The swap spread is defined as the spread paid by the:
    A. floating-rate payer over the rate of same maturity of the most recently issued government security.
    B. fixed-rate payer over the rate of same maturity of the most recently issued government security.
    C. fixed-rate payer over the investment grade corporate bonds of the same maturity.

21. The swap spread is quoted as 90 bps. If the fixed payer in a four-year interest rate swap is paying a rate of 3.05%, then the four-year government bond is yielding:
    A. 3.95%.
    B. 3.05%.
    C. 2.15%.

22. A US$ 1 million Eny Corporation bond paying a semiannual coupon of 3.125% and has 2.5 years remaining to maturity. The treasury rates of two-year and three-year maturities are 1.01% and 1.13%. If the swap spread for the same maturity as the bond is 1.676%, then the yield to maturity on the bond is *closest* to:
    A. 2.75%.
    B. 2.81%.
    C. 2.69%.

23. Which of the following statements is *least* accurate?
    A. The swap spread helps an investor assess the time value, liquidity and credit components of the yield to maturity of a bond.
    B. The Z-spread is less accurate than an interpolated yield, when interest rate swap curves are steep.
    C. The Z-spread is the constant spread in basis points when added to the implied spot yield curve gives the invoice price of the bond.

24. The Z-spread of Bond X is 250 bps and the Z-spread of Bond Y is 190 bps. All else equal, which statement is *most* accurate?
    A. Bond Y is discounted at a higher rate than Bond X.
    B. Bond X is riskier than Bond Y.
    C. Bond Y will sell at a lower price than Bond X.

25. The TED spread is the:
    A. difference between Libor and T-bill yield of same maturity.
    B. difference between the swap rate and T-bill rate of the same maturity.
    C. difference between the spot rate and forward rate one year from today.

26. An increase in the TED spread *most likely* indicates that the:
    A. liquidity risk in the general economy is decreasing.
    B. liquidity risk in the interbank market is increasing.
    C. default risk on interbank loans is increasing.

27. The Libor-OIS spread reflects the:
    A. risk and liquidity of money market securities.
    B. differing supply and demand conditions.
    C. credit risk in the banking system.

28. According to the pure expectations theory forward rates are:
    A. upwardly biased measure of future spot rates.
    B. unbiased predictor of future spot rates.
    C. biased estimate of future spot rates.

29. Compared to the pure expectations theory, the local expectations theory asserts that:
    A. the buying a seven-year bond and holding it for five years is the same as buying a five-year bond.
    B. the return for every bond over the short term is the risk-free rate.

C. the return for every bond is the risk-free rate for that maturity, because investors do not require risk premiums.

30. Which statement is *least likely* correct? The shape of the yield curve is typically upward sloping as claimed by the liquidity preference theory because of the:
    A. liquidity premium required by lenders to compensate for interest rate risk.
    B. yield premium to account for the lack of liquidity in longer-dated debt instruments.
    C. liquidity premium that increases with maturity.

31. The theory which asserts that investors limit investments to those maturity sectors that match the maturities of their liabilities is *best* known as the:
    A. preferred habitat theory.
    B. segmented markets theory.
    C. unbiased expectations theory.

32. Which theory proposes that the term structure of interest rates is influenced by both market expectations and institutional factors?
    A. Preferred habitat theory.
    B. Liquidity preference theory.
    C. Pure expectations theory.

33. The equilibrium term structure models require the specifications of which two terms?
    A. The drift term and the stochastic or volatility term.
    B. The short-term rate and the long-term rate.
    C. The term premium and the risk premium.

34. The Vasicek model, unlike the CIR model:
    A. allows for volatility to be proportional to interest rates levels.
    B. avoids the possibility of negative interest rates.
    C. assumes that volatility does not rise with interest rates instead remains constant over the analysis period.

35. The estimated yield curve is *most likely* modeled accurately to match the observed yield curve with the:
    A. Vasicek model.
    B. CIR model.
    C. Ho-Lee model.

36. Relative to the equilibrium model, the arbitrage-free models do not:
    A. value bonds with embedded options.
    B. try to explain the observed yield curve.
    C. allow for uncertainty in the shape of the yield curve.

37. A movement in which the yield curve shifts upwards or downwards is best known as a:
    A. curvature movement.
    B. steepness movement.

C. level movement.

38. If there are positive yield changes in the short-term rate and the long-term rate but a decline in the middle-term rate, then the movement is *best* known as a change in the:
    A. curvature of the curve.
    B. steepness of the curve.
    C. level of the curve.

39. The measure that identifies shaping risk is *least likely*:
    A. key rate duration.
    B. three-factor model of yield curve sensitivities to parallel, steepness, and curvature movements.
    C. effective duration.

40. Volatility term structure measures:
    A. yield curve risk.
    B. shaping risk.
    C. curvature movements in the yield curve.

Set 1 Solutions

1. A is correct. The forward rates mentioned in Option A, f(2,1), f(3,1), f(2,2) can be calculated using the following equations.
   $[1 + r(3)]^3 = [1 + r(2)]^2 [1 + f(2,1)]^1$
   $[1 + r(4)]^4 = [1 + r(3)]^3 [1 + f(3,1)]^1$
   $[1 + r(4)]^4 = [1 + r(2)]^2 [1 + f(2,2)]^2$
   B and C are incorrect because each requires the five-year spot rate r(5). Section 2.1. LO.a.

2. B is correct. The relationship between the four-year spot rate, two-year spot rate and two-year forward rate two years from now using equation 4 (Section 2.1) is given as:
   $[1 + r(T^*+T)]^{(T^*+T)} = [1 + r(T^*)]^{T^*} [1+ f(T^*,T)]^T$
   $[1 + r(4)]^{(4)} = [1 + r(2)]^2 [1 + f(2,2)]^2$. Section 2.1. LO.a.

3. B is correct. A and C are the true interpretations of 9.00%. It is the reinvestment rate that would make a buyer indifferent between investing in a six-year zero-coupon bond or buying a five-year zero-coupon bond and at maturity reinvesting the proceeds for one year. Forward rate hence, is a type of breakeven interest rate. The 9.00% forward rate can also be interpreted as a rate that can be locked in by extending maturity by one year by investing in a six-year zero-coupon bond. Section 2.1. LO.a.

4. A is correct. A downward-sloping yield curve indicates a market expectation of falling future inflation rates (because a premium for expected inflation is added into the nominal yield) from a relatively high current level. B & C are incorrect because an upward-sloping yield curve reflects market expectation of increasing future inflation associated with strong economic growth. Section 2.1. LO.a.

5. B is correct. The yield to maturity is the expected rate of return of a bond if certain conditions are met. These are that the bond is held till maturity, all coupons and principal are paid in full as they become due, and coupons are reinvested at the original YTM. A & C are incorrect because the YTM is a poor estimate of expected return if interest rates are volatile; yield curve is steeply sloped; there is risk of default; or bond has embedded options (e.g., put, call). Section 2.2. LO.a.

6. B is correct. The two-year spot rate is 3.00%. The four-year spot rate is 5.00%. The forward price of a two-year bond to be issued in two year F(2, 2) can be calculated using equation 2:
   $P(T^* + T) = P(T^*)F(T^*,T)$ and so: $F(2, 2) = P(4) / P(2)$

$$P(T) = \frac{1}{[1 + r(T)]^T}$$

$$P(2) = \frac{1}{[1 + r(2)]^2}$$

$$P(2) = \frac{1}{1.03^2} = 0.9426$$

$$P(4) = \frac{1}{1.05^4} = 0.8227$$

$$F(2, 2) = \frac{0.8227}{0.9426} = 0.8728.$$ Section 2. LO.b.

7. A is correct. f(1,2) is calculated as follows:

   $f(1,2) = \sqrt[2]{\frac{[1+r(3)]^3}{[1+r(1)]^1}} - 1$

   $f(1,2) = \sqrt[2]{\frac{[1.05]^3}{[1.03]}} - 1 = 6.0145\%$ which is greater than 5.00% (r3). Section 2.1. LO.b.

8. C is correct. The zero-coupon rates are determined by using the par yields and solving for the zero-coupon rates, by bootstrapping. The one-year zero-coupon rate is the same as the one-year par rate because of the assumption of annual coupons. The two-year zero-coupon rate is determined by solving the following equation in terms of one monetary unit of current market value, using r(1) = 3%:

   $1 = \frac{0.0365}{(1.03)} + \frac{1+0.0365}{[1+r(2)]^2}$

   Solving the equation for r(2)

   $1 - \frac{0.0365}{1.03} = \frac{1.0365}{[1+r(2)]^2}$

   $[1 + r(2)^2] = \frac{1.0365}{0.964563}$

   $r(2) = \sqrt[2]{1.0746} - 1$

   r(2) = 3.6629%. Section 2.1. LO.c.

9. C is correct. The par curve indicates the yields to maturity on coupon-paying government bonds, priced at par, for different maturities. Section 2.1. LO.c.

10. A is correct. The total return on a zero-coupon bond over a holding period of one-year is the one-year rate if the spot rates evolve as implied by the current forward rate curve. Section 2.4. LO.d.

11. B is correct. At time 0, the price of a \$100-par, zero-coupon bond will be $100/1.06^2 = 88.9996$. At time 1, the price of a \$100-par, zero-coupon bond will be 100/1.06 = 94.3396. Hence, the return of the two-year zero-coupon bond over the one-year holding period will be 94.3396/88.9996 – 1 = 6%. In this scenario, the spot rate one year from today does not reflect the forward rate curve at time 0. Consequently, the one-year holding period return of a two-year bond will be different from the one-year holding period return of a one-year bond. Section 2.4. LO.d.

12. A is correct. A bond is undervalued if the investor's expectation about the future spot rates is lower than the forward rate for the same maturity. This is because the market is discounting payments of the bond at a higher rate than the investor. Hence the market price is less than the bond's intrinsic value. A bond is overvalued if the expected future spot rates are higher than quoted forward rate. Section 2.4. LO.d.

13. A is correct. The return will be less than the one-period risk-free rate, because the bond's actual value at the end of year 1 will be less than what was projected at time 0. B & C are incorrect because if spot rates evolve as predicted by current forward curve then bond's return is the one-period risk-free rate. If projected spot rates are lower than the current

forward curve, the bond's return will be more than the one-period risk-free rate. Section 2.4. LO.d.

14. A is correct. When the yield curve is upward sloping and does not change level or shape, then buying a bond with the investment period shorter than its maturity would provide a total return greater than the return on a maturity-matching strategy. This is because the bond is valued at lower yields and higher prices as it nears maturity. Section 2.4. LO.e.

15. C is correct. The yield curve trade that an active bond investor often makes when the yield curve is upward sloping is known as riding the yield curve or rolling down the yield curve, because the trade is based on buying a bond with a maturity longer than the investment period and selling it before maturity to earn a higher total return than the maturity-matching strategy. Section 2.4. LO.e.

16. B is correct. A forward contract price will decrease if future spot rates are higher than what is predicted by current forward rates. This is because cash flows will be discounted at an interest rate that is greater than what was initially expected. A forward contract value will increase if future spot rate is expected to be lower than the prevailing forward rate. Section 2.3. LO.e.

17. B is correct. The swap rate is the interest rate for the fixed-rate leg of an interest rate swap. Section 3.1. LO.f.

18. B is correct. The swap market is highly liquid because it consists of counterparties and not multiple borrowers or lenders, and provides the most efficient method to hedge interest rate risk. Section 3.1. LO.f.

19. C is correct. The swap rate at time T =1 can be calculated from the formula:
$\frac{s(1)}{[1+r(1)]^1} + \frac{1}{[1+r(1)]^1} = \frac{s(1)}{(1.04)^1} + \frac{1}{(1.04)^1} = 1$
Where $r(1) = \left[\frac{1}{0.9615}\right]^{\left(\frac{1}{1}\right)} - 1 = 4.00\%$
Hence $s(1) = 4.00\%$. Section 3.3. LO.f.

20. B is correct. The swap spread is defined as the spread paid by the fixed-rate payer over the rate of same maturity of most recently issued ("on-the-run") government security. Section: 3.4. LO.g.

21. C is correct. The fixed leg of the four-year fixed-for-floating swap is 3.05% and the swap spread is 90 bps, then: govt. bond rate + 0.9% = 3.05%.⟹ government bond rate = 2.15%. Section 3.4. LO.g.

22. A is correct. By interpolation between the two treasury rates, the swap rate for 2.5 years is:
$\left[1.01\% + \left(\frac{180}{360}\right)(1.13\% - 1.01\%)\right] = 1.07\%$, the swap spread is 1.676%.
The yield to maturity on the bond is 1.070% + 1.676% = 2.746%. Section 3.4. LO.g.

23. B is correct. The Z-spread is more accurate than a yield that is interpolated linearly, especially with steep interest rate swap curves. A & C are accurate statements. Section 3.4. LO.h.

24. B is correct. The Z-spread of Bond X is 250 bps and the Z-spread of Bond Y is 190 bps. The higher Z-spread for Bond X implies it is riskier than Bond Y. The higher discount rate will make the price of Bond X lower than Bond Y. Section 3.4. LO.h.

25. A is correct. The TED spread is the difference between Libor and T-bill yield of similar maturity. B is incorrect because it is the swap spread. Section 3.5. LO.i.

26. C is correct. An increase in the TED spread indicates that the default risk on interbank loans is increasing. The TED spread is an indicator of perceived credit risk in the general economy. It is not a sign of liquidity risk. Section 3.5. LO.i.

27. A is correct. The Libor-OIS spread is an indicator of risk and liquidity of money market securities. B is incorrect because the 10-year swap spread indicates the differing supply and demand conditions. C is incorrect because the TED spread indicates risk in the banking system. Section 3.5. LO.i.

28. B is correct. A pure expectations theory says that the forward rates are unbiased predictors of future spot rates. Section 4.1. LO.j.

29. B is correct. The local expectations theory differs from the pure expectations theory because it asserts that the expected return for every bond over the short-term periods is the risk free rate, rather than contending that every bond yields the risk-free rate for that specific maturity. Local expectations theory requires no risk premiums for only short holding periods but considers risk premiums on longer term investments. Section 4.1. LO.j.

30. B is correct. The shape of the yield curve is typically upward sloping as claimed by the liquidity preference theory because of the liquidity premium required by lenders to compensate for interest rate risk. The liquidity premium increases with maturity. This is not to be confused with the yield premium required for the lack of liquidity borne by the thinly traded bonds. Section 4.2. LO.j.

31. B is correct. The theory which asserts that investors limit investments to those maturity sectors that match the maturities of their liabilities is *best* known as the segmented markets theory. This theory is consistent with the presence of asset/liability constraints of the investors which are either regulatory or self-imposed. Investors hold debt securities that match their investment horizon to avoid risks related to asset/liability mismatch. Section 4.3. LO.j.

32. A is correct. The preferred habitat theory asserts that investors and institutions will accept additional risk in return for additional expected return. In this theory both market expectations and institutional factors influence the term structure of interest rates. Section: 4.4. LO.j.

33. A is correct. The equilibrium term structure models require the specification of a drift term and the assumption for interest rate volatility. The CIR model and the Vasicek model have two parts: (1) a deterministic part (sometimes called a "drift term"), the expression in dt, and (2) a stochastic (i.e., random) part, the expression in dz, which models risk. Sections 5.1; 5.1.1. LO.k.

34. C is correct. The Vasicek model, unlike the CIR model makes the assumption of constant volatility over the analysis period for the calculation of interest rates. Under the Vasicek model, it is theoretically possible for interest rate to be negative. The CIR model allows increase in volatility with the level of interest rates. Section 5.1.2. LO.k.

35. C is correct. The Ho-Lee model provides the most accurate model for estimating the yield curve to match the observed yield curve, because it allows the parameter to vary deterministically with time. Section 5.2. LO.k.

36. B is correct. The arbitrage-free models can be used to value different types of bonds. The equilibrium models (both CIR model and Vasicek model) describe the yield curve movement by estimating movement in a single short-term rate. But the arbitrage-free models do not explain the observed term structure, instead they take the yield curve as given. Arbitrage-free models can be used to value many types of bonds and allow for uncertain changes in yield curve. Section 5.2. LO.k.

37. C is correct. The level movement refers to an upward or downward shift in the yield curve. Steepness refers to non-parallel shift in the yield curve and curvature is movement in three segments of the yield curve (short-term, long-term, and middle-term). Section 6.2. LO.l.

38. A is correct. A unit positive change in the standard deviation of the factor causing positive yield changes in the short-term rate and the long-term rate but a decline in the middle-term rate is described a change in the curvature or 'twist' of the curve. Section 6.2. LO.l.

39. C is correct. Key rate duration or sensitivities to parallel, steepness, and curvature movements allow one to identify and manage shaping risk, which is the sensitivity to changes in the shape of the yield curve in addition to the risk related to parallel changes. Effective duration only addresses the latter. Section 6.4. LO.l.

40. A is correct. Volatility term structure measures yield curve risk. It represents the yield volatility of a zero-coupon bond for every maturity of security. Section 6.3. LO.m.

Set 2 Questions

The following information relates to questions 1 – 3.

Sarah Miller, a quantitative analyst has been given the task of analyzing a newly issued, US Treasury bond with a five-year maturity and an annual coupon of 9.00%. The bond was issued at a price of 101.89 to yield 8.52%. Miller is evaluating this bond for investors who will buy this bond with the intention of holding it to maturity. Her analysis is based on an expectation that the forward rates are the future spot rates. Current spot rates and extrapolated one year forward rates are provided in Table 1.

Table 1: Spot and Forward Interest Rates

Year	Spot Rate	Forward Rate
1	5.0%	
2	6.0%	7.0%
3	7.0%	9.0%
4	8.0%	11.1%
5	9.0%	13.1%

Miller's supervisor Kathy asks, "suppose an investor purchases this five-year US Treasury bond at 101.89, to yield 8.52% to maturity. But then holds the bond for only two years, at which time the 1 year, 2 year and 3 year spot interest rates are each assumed to equal 10.00%. Will this Treasury bond be overvalued or undervalued?"

1. Based on Table 1, and assuming Miller's interest rate expectation materializes, the realized return for the US Treasury bond if held to maturity is *closest* to:
   A. 8.52%.
   B. 8.90%.
   C. 1.50%.

2. Based on Table 1, and considering Kathy's assumptions that an investor who buys this five year US Treasury bond and sells it after two years, the bond is currently *most likely*:
   A. overvalued.
   B. undervalued.
   C. fairly valued.

3. Based on Table 1 and Kathy's assumptions, the annualized realized return for holding the US Treasury bond for two years is *closest* to:
   A. -1.5%.
   B. -2.2%.
   C. -3.4%.

4. Riley Scott, a fixed income analyst suggests a newly issued, five-year term US Treasury zero-coupon note priced at $68.06 ($100.00 face value) to his portfolio manager for investment. The bond yields 8.00% to maturity. According to Scott some investors may purchase this Treasury zero-coupon note today and hold it to maturity, while others may buy

the same Treasury note in two years and then hold it for three years to maturity. Scott's portfolio manager asks him to calculate the forward rate that would cause investors to be indifferent about either purchasing the Treasury zero-coupon note today or purchasing it in two years. Given the spot rates r(1) = 5%, r(2) = 6%, r(3) = 7%, r(4) = 8%, r(5) = 9%; the forward rate that would make an investor indifferent between buying the Treasury note today or in two years is *closest* to:

A. 9%.
B. 7%.
C. 11%.

5. Richard Kors discusses a newly issued zero-coupon bond by CBOX Corporation with his supervisor. It is rated A1/A+, with seven years to maturity priced to yield 8.50% to maturity. This credit typically trades in line with high-quality banks and corporate issuers. Current market rates are 8% for the seven-year risk-free spot rate, and the seven-year swap spread is 0.50%. Kors' supervisor wants to know if this bond is mispriced? Kors *best* response is: The newly issued zero-coupon CBOX bond is:

A. not mispriced.
B. mispriced because of the difference between the swap rate and the spot rate.
C. mispriced because of the difference between the swap rate and bond yield.

6. Kiran Bindre a newly hired junior risk manager is asked to review credit spread indicators that measure credit and liquidity risk for fixed income securities. Bindre makes the following observations about credit risk measures.

    1. *Z*-spread represents the difference between the yield on credit bonds and the implied spot yield curve.
    2. Libor-OIS (overnight index swaps) spread is the difference between Libor and high quality corporate bonds' yields.
    3. TED (Treasury-eurodollar) spread represents the difference between Libor and overnight indexed swap rates.

   Which of Bindre's observations is *most likely* correct?

A. Observation 1.
B. Observation 2.
C. Observation 3.

7. Sam Hunt is asked to evaluate the impact of yield curve movements on fixed-income securities. He constructs a yield curve factor model that describes three independent yield curve movements. The yield curve movements are shown below.

Time to Maturity	1 Year	2 Years	3 Years	4 Years	5 Years
Factor 1	0.55%	0.81%	1.19%	1.67%	2.23%
Factor 2	-0.35	0.77	1.53	0.76	-0.33
Factor 3	0.72	0.73	0.74	0.75	0.76

Based on the table above, the movements characterized by Factor 1, Factor 2, and Factor 3 are *most likely*:

A. steepness, curvature, and level.
B. curvature, level, and steepness.

C. level, steepness, and curvature.

8. Chris Bird, Director of Research at a securities firm, makes the following comments regarding the term structure theories which provide an explanation of the term structure shape to his team of fixed income analysts:
   Comment 1: "The pure expectations theory states that the forward rate is an unbiased predictor of the future spot rate. This theory is consistent with the assumption that investors are risk averse as they are affected by uncertainty and require a risk premium.
   Comment 2: The liquidity preference theory assumes a liquidity premium to compensate investors for taking more interest rate risk by investing in longer maturity bonds. Therefore, this theory predicts an upward sloping yield curve because of the liquidity premium, even if spot rates are expected to be unchanged.
   Comment 3: A third explanation of the shape of the yield curve is the segmented markets theory which asserts that yields are a function of supply and demand for funds of a specific maturity. This is similar to the preferred habitat theory in proposing that investors and borrowers having strong preferences for particular maturities."
   Which of Bird's comments regarding the theories of the term structure of interest rates is *least likely* correct?
   A. III.
   B. II.
   C. I.

9. Rana Dabir, a quantitative analyst is evaluating whether a four-year 8% annual-coupon Treasury bond priced to yield 9.72% to maturity is cheap (buy recommendation), fairly valued (hold recommendation) or rich (sell recommendation) based on arbitrage opportunities. Dabir has collected the following data:

	Year 1	Year 2	Year 3	Year 4
Spot rate	0.068			0.1020
Discount rate			0.7797	
Forward rate f(2,1)			0.112	

   Based on the data and the yield to maturity given above, Dabir should *most likely*:
   A. hold the Treasury bond.
   B. sell the Treasury bond.
   C. buy the Treasury bond.

10. Two portfolio managers are discussing a portfolio management strategy called riding the yield curve.
    Portfolio manager 1: "This strategy can enhance portfolio total return by buying bonds with maturities longer than their investment horizon whenever the yield curve is upward sloping, is expected to maintain the same level and shape and spot rates rise as predicted by forward rates."
    Portfolio manager 2: "I agree**,** this strategy can continuously increase the portfolio total return even if interest rates increase unexpectedly, because as the bonds roll down the yield curve, they will appreciate in price."

Regarding how investors can profit from riding the yield curve, the portfolio manager *most likely* correct is:
A. neither.
B. Portfolio manager 1.
C. Portfolio manager 2.

11. Tom Bailey, fund manager makes the following statements while giving a presentation on spread measures in fixed income securities:
Statement 1: "The Z-spread uses the implied spot yield curve and adds the spread necessary to discount the bond's cash flows and derive its current market price. It is a useful measure of risk for corporate bonds.
Statement 2: The TED spread is used for the valuation of government bonds and is calculated as the difference between Libor and the yield on a T-bill of equal maturity.
Statement 3: The Libor-OIS spread incorporates an index rate which is typically the rate for overnight unsecured lending between banks. The Libor-OIS spread serves as an indicator of risk and liquidity of money market securities."
Bailey is *least likely* correct regarding which spread measure?
A. Z-spread.
B. TED spread.
C. Libor-OIS spread.

12. Aki Hiroshi, director research assigns Sally Jun, analyst to value a bond, issued by AAA rated Japanese International Bank (JIB), maturing in 2.94 years, with a coupon rate of 1.94% paid annually. Dealers are quoting the bond flat to swaps. Hiroshi advises Jun to use simple interpolation to calculate the swap spread. Jun gathers the following information:

Maturity (Years)	**1**	**2**	**3**	**4**
Off the run JGB yield (%)	-0.26	-0.13	0.02	0.17
On the run JGB yield (%)	-0.20	-0.04	0.11	0.28
Swap rate (%)	0.40	0.58	0.75	0.96

Based on the data given above, the spread for the credit and liquidity component of the JIB bond's yield to maturity is *closest* to:
A. 0.74.
B. 0.64.
C. 0.58.

13. Canan Enver is evaluating a portfolio of zero-coupon bonds with maturities of 1, 5 and 10 years. Enver is analyzing what happens as rates change across the yield curve. He assumes the following portfolio sensitivities to factors given in Table 1. The portfolio has equal weightings in each key rate duration and an effective duration of 5.33. Enver's supervisor asks him to examine the effect on the portfolio return if rates rise evenly across the curve and when the curve flattens but does not twist.
Table 1: Factor Movements and Key Rate Durations

Year	**1**	**5**	**10**
Parallel	1	1	1
Steepness	1	0	-1
Curvature	1	0	1

Key Rate Durations	0.33	1.67	3.33

Based on Table 1 and the supervisor's assumptions, the impact on the portfolio would *most likely* be a loss in value from changes in:

A. level and a loss from changes in steepness.
B. level and a gain from changes in steepness.
C. steepness and a gain from changes in curvature.

Set 2 Solutions

1. B is correct. The present value of the bond is 101.89. Since the forward rates are assumed to be the future spot rates, the value of the bond at the end of Year 5 is calculated as follows: 9(1.07)(1.09)(1.111)(1.131) + 9(1.09)(1.111)(1.131) + 9(1.111)(1.131) +9(1.131) +109 = 156.00. The annualized realized return = $(\frac{156.00}{101.89})^{\frac{1}{5}} - 1 = 8.89\%$. Section 2.2. LO.a.

2. A is correct. Given the forward curve in Table 1 and Kathy's assumptions, the US Treasury bond is overvalued. The future expected spot rates (10.0% in each of the remaining three years) is higher than the forward rate of the same maturity (one-year rate two years forward 9% as implied by the current spot curve). The market is discounting the bond at lower rates hence the market price is higher than its intrinsic value calculated at the assumed higher spot rate. Presuming that the forward curve shifts as anticipated by Kathy, fair value of the bond is: 97.51. [Using FC: N = 3; I = 10, PMT = 9, FV = 100, CPT PV]. The rates rose higher than the expected forward rates, resulting in a decline in bond price compared to the original estimates. Hence the bond was overvalued. Section 2.4. LO.a.

3. B is correct. The five year 9% annual coupon US Treasury bond was purchased at 101.89 and after two years with spot rates of 10% for each of the remaining three years (according to Kathy's assumptions) sold at 97.51 (based on interest rates of 10% for each of the remaing three years). Hence the annualized realized return over two year is = $(\frac{97.51}{101.89})^{1/2} - 1 = -2.17\%$. Section 2.4. LO.a.

4. C is correct. The forward rate two years from now maturing in three years f(2,3) that would make an investor indifferent in purchasing the 5 year US Treasury note today or two years from today is: $[1 + r(5)]^5 = [1 + r(2)]^2[1 + f(2,3)]^3 = (1.09)^5 = (1.06)^2[1 + f(2,3)]^3$. $f(2,3) = (\frac{1.53862}{1.1236})^{\frac{1}{3}} - 1 = 11.047\% \cong 11.05\%$. Section 2.1. LO.b.

5. A is correct. The CBOX bond is likely not mispriced because the swap rate (8% + 0.5% = 8.5%) is equal to the bond's yield to maturity. Also the default risk rating of A1/A+ matches the default risk rating of high-quality commercial banks which is generally A1/A+. Section 3.4. LO.f.

6. A is correct. Z-spread is the constant basis point spread that would need to be added to the implied spot yield curve to determine bond price. B & C are incorrect. TED spread is the difference between Libor and T-bill yield of matching maturity, and Libor-OIS spread is the difference between Libor and overnight indexed swap (OIS) rate. Section 3.5. LO.h,i.

7. A is correct. Factor 1 represents a change in steepness in the yield curve because the changes in yield increase through each maturity point. Factor 2 shows change in curvature because the changes in the short-term and long-term are different from the middle term. Factor 3 represents a change in level because the changes in yield are equal across all maturity points. Section 6.2. LO.l.

8. C is correct. Bird is incorrect regarding uncertainty and pure expectations theory. According to this theory investors are unaffected by uncertainty and risk premiums do not exist. Comments 2 & 3 are correct. Section 4. LO.j.

9. B is correct. The quoted YTM of 9.72%, results in a bond price of 94.5146 [N= 4, I = 9.72, PMT = 8, FV = 100, CPT PV]. The bond price based on the spot rates = $\frac{8}{1.068} + \frac{8}{(1.074)^2} + \frac{8}{(1.0865)^3} + \frac{108}{(1.102)^4} = 93.89496$. Where: Year 3 spot rate r(3) $\frac{1}{P(3)} = \{1 + r(3)\}^3 = \frac{1}{0.7797} = \{1 + r(3)\}^3 \Rightarrow r(3) = 8.65\%$. Year 2 spot rate r(2) $[1 + r(3)]^3 = [1 + r(2)]^2[1 + f(2,1)]^1 = \frac{(1.0865)^3}{(1.112)} = [1 + r(2)]^2 \Rightarrow$ r(2) = 7.40%.
The quoted YTM 9.72% [bond price of 94.52] is more expensive than the YTM 9.92% [bond price of 93.89] based on spot rates, hence the analyst should sell the bond. $\frac{8}{1.068} + \frac{8}{1.074^2} + \frac{8}{1.0865^3} + \frac{108}{1.1020^4} = 93.895$. Sections 2- 2.2. LO. a, b.

10. B is correct. Portfolio manager 1 is correct in his interpretation of increasing returns from rolling down the yield curve. However, if rates rise unexpectedly more than what is predicted by the forward curve the bond will lose value as its priced at higher rates. Hence Portfolio manager 2 is incorrect. Section 2.4. LO.e.

11. B is correct. The TED spread is a measure of perceived credit risk in the general economy, it is not used in valuation of individual bonds. A & C are correct statements. Section 3.5. LO. h.

12. B is correct. The swap spread represents the return that investors require for credit and liquidity. Since dealers are quoting the bond flat to swaps or swaps + 0 basis points there is no added spread to swaps. The swap spread is measured over the "on-the-run" or most recently issued government security, in this case "on the run" JGB (Japanese government bonds). Simple interpolation is used to calculate the swap spread.
JGB yield for the maturity: -0.04 + 0.94 × {0.11 – (-0.04)} = 0.10
The swap rate for the maturity: 0.58 + 0.94 × (0.75 – 0.58) = 0.7398 = 0.74 approx. The difference represents the swap spread: 0.74 – 0.10 = 0.64. Section 3.4. LO.f,g.

13. A is correct a parallel shift of the yield curve would result in a loss across each key rate duration given a sensitivity of 1. For example, a 100 basis point (bps) parallel shift would result in 5.33% (approximately) loss in value. A flattening of the yield curve in the long end would result in a loss given a sensitivity of –1. For example, a 100 bps decline in the 10-year key rate duration would result in a loss of approximately 1.11% (–100 × –0.01 ×–3.33 × 0.333). There is no impact from curvature, since the curve did not "twist". Section 6.4. LO.l.