LO.a: Calculate a bond's price given a market discount rate.

1. A bond with 5 years remaining to maturity offers a coupon rate of 9% with interest paid annually. At a market discount rate of 9%, the price of the bond per $100 of par is *closest* to:
   A. $97.15.
   B. $100.00.
   C. $103.26.

2. An investor who owns a bond with a 10% coupon rate that pays interest semiannually and matures in four years is considering selling it. If the required rate of return on the bond is 12%, the price of the bond per $100 of par value is *closest* to:
   A. $93.79.
   B. $100.00.
   C. $106.34.

3. A four-year bond has a coupon rate of 6% paid annually. Given that the market discount rate is 4%, the price of the bond is most likely to be:
   A. $93.1.
   B. $102.1.
   C. $107.3.

4. A bond offering an annual coupon rate of 6%, paying interest semiannually, matures in 6 years. Given that the market discount rate is 4%, which of the following is most likely to be the price of the bond?
   A. $94.8.
   B. $105.6.
   C. $110.5.

5. A bond offers an annual coupon rate of 6%, with interest paid quarterly. The bond matures in three years. At a market discount rate of 5%, the price of this bond per $100 of par value is *closest* to:
   A. $98.26.
   B. $100.00.
   C. $102.76.

6. A zero coupon bond with a face value of $500 matures in 10 years. At a market discount rate of 5% and assuming annual compounding, the price of the bond is *closest* to:
   A. $310.97.
   B. $306.96.
   C. $300.05.

7. The market value of a 20-year zero-coupon bond with a maturity value of $100 discounted at a 15% annual interest rate with semi-annual compounding is *closest* to:
   A. $74.88.
   B. $76.61.
   C. $5.54.

8. Analyst 1: A bond is priced at premium when the coupon rate is greater than the market discount rate. A bond is priced at discount when the coupon rate is less than the market discount rate.
   Analyst 2: A bond is priced at premium when the coupon rate is less than the market discount rate. A bond is priced at discount when the coupon rate is more than the market discount rate.
   Which analyst's statement is *most likely* correct?
   A. Analyst 1.
   B. Analyst 2.
   C. Neither.

9. A 1-year, semiannual-pay bond has a $1,000 face value and a 10% coupon. Which of the following statements is *most* accurate?
   A. At a discount rate of 8%, the bond will be priced at a discount.
   B. At a discount rate of 10%, the bond will be priced at par.
   C. At a discount rate of 12%, the bond will be priced at a premium.

LO.b: Identify the relationships among a bond's price, coupon rate, maturity, and market discount rate (yield-to-maturity).

10. The price-yield relationship for an option-free bond is *most likely* a:
    A. straight line relationship.
    B. convex relationship.
    C. concave relationship.

11. The bond is most likely to be priced at a premium above par value when:
    A. Coupon rate < Market discount rate.
    B. Coupon rate = Market discount rate.
    C. Coupon rate > Market discount rate.

12. According to constant-yield price trajectory, if a bond is selling at a discount, its price:
    A. increases over time.
    B. decreases over time.
    C. is unchanged.

13. Bond A has term to maturity of 1 year. Bond B has a term to maturity of 10 years. All else equal:
    A. bond A will have greater price volatility.
    B. bond B will have greater price volatility.
    C. both bonds will have the same price volatility.

14. Bond A has a coupon of 7%. Bond B has a coupon of 4%. All else equal:
    A. bond A will have greater price volatility.
    B. bond B will have greater price volatility.
    C. both bonds will have the same price volatility.

15. The yield to maturity is least likely to be known as:
    A. implied coupon rate.
    B. internal rate of return.
    C. yield to redemption.

16. Which of the following is most likely to be the price of a zero coupon bond maturing in 12 years, with par value $100? Assume the market discount rate to be 3.5%, and annual compounding.
    A. $66.2.
    B. $69.8.
    C. $72.4.

17. The following table shows details of three bonds.

Bond	Price	Coupon Rate	Time-to Maturity
A	102.8	4%	3 years
B	100.0	5%	3 years
C	98.6	4%	4 years

    Given that the market discount rates for all three bonds increases by 150 basis points, which of the following bonds is most likely to experience the smallest percentage change in price?
    A. Bond A.
    B. Bond B.
    C. Bond C.

18. A Singaporean institutional investor owns a 3-year bond priced at S$104.80. Given that the coupon payment per year is S$2.4, which of the following is most likely to be the yield to maturity?
    A. 0.679%.
    B. 0.775%.
    C. 0.787%.

19. A zero coupon bond priced at 80 per 100 of par value issued today will mature in 4 years. Given that the periodicity is 12, which of the following is most likely to be the yield to maturity of the bond?
    A. 4.98%.
    B. 5.53%.
    C. 5.59%.

20. Which of the following statements is least likely to be correct?
    A. Current yield is a common yield measure for fixed income bonds and is also known as income yield.
    B. Street convention refers to a yield measure that neglects weekends and holidays.
    C. The true yield is mostly higher than the street convention because of weekends and holidays.

21. Which of the following statements is most likely to be correct?

A. The highest of the sequence of yields-to-call and yields-to-maturity is known as the yield-to-worst.
B. The option adjusted yield is the required market discount whereby the price is adjusted for the value of the embedded option.
C. The value of an embedded call option is subtracted from the flat price of bond to get the option-adjusted price.

22. Which of the following statements is least likely to be correct about the relationships between bond price and bond characteristics?
Statement I: The bond price is inversely related to the market discount rate.
Statement II: For the same coupon rate, a shorter-term bond has a greater percentage price change than a longer-term bond if the market discount rates change by the same amount.
Statement III: For the same time-to-maturity, a higher coupon bond has a greater percentage price change than a lower coupon bond when market discount rates change by the same amount.
A. Statement II only.
B. Statements I and III.
C. Statements II and III.

23. Bond A has a greater yield to maturity than Bond B. Which of the following is least likely to be the reason for this?
A. Bond A has a non-investment grade rating while Bond B has an investment grade rating.
B. Bond A has greater liquidity than Bond B.
C. Bond A is denominated in a currency with a higher expected rate of inflation than the currency in which Bond B is denominated.

24. A bond with a coupon rate of 5% paid annually maturing in 30 years has a face value of $10,000 and is currently trading at $12,523. The yield to maturity for this bond at current market prices is *closest* to:
A. 3.61%.
B. 4.23%.
C. 3.52%.

25. Statement 1: The percentage decrease in the price of a bond for a given increase in yield is smaller than the percentage increase in the price of a bond when yield decreases by same amount.
Statement 2: The percentage decrease in the price of a bond for a given increase in yield is larger than the percentage increase in the price of a bond when yield decreases by same amount.
Which statement is *most likely* correct?
A. Statement 1.
B. Statement 2.
C. Neither of them.

26. Suppose a bond's price is expected to decrease by 2% if its market discount rate increases by 100 basis points. If the bond's market discount rate decreases by 100 basis points, the bond price is *most likely* to change by:
    A. 2%.
    B. less than 2%.
    C. more than 2%.

27. Analyst 1: Constant-yield price trajectory states that the bond price converges to par value as it reaches maturity, if the yield to maturity is constant.
    Analyst 2: Constant-yield price trajectory states that the bond price converges to par value as it reaches maturity. Yield to maturity does not affect the change in prices.
    Which analyst's statement is *most likely* correct?
    A. Analyst 1.
    B. Analyst 2.
    C. Neither of them.

28. Consider a $1,000 par value bond with a 5% coupon paid annually and 10 years to maturity. At a discount rate of 4.5%, the value of the bond today is $1,039.56. One day later, the discount rate increases to 6.5%. Assuming the discount rate remains at 6.5% over the remaining life of the bond, what is *most likely* to occur to the price of the bond between today and maturity?
    A. Increase and then decrease.
    B. Decrease and then increase.
    C. Decrease and then remain unchanged.

29. Consider a $1,000 par value bond with a 5% coupon paid annually and 10 years to maturity. At a discount rate of 6.5%, the value of the bond today is $892.17. One day later, the discount rate decreases to 4.5%. Assuming the discount rate remains at 4.5% over the remaining life of the bond, what is *most likely* to occur to the price of the bond between today and maturity?
    A. Increase and then decrease.
    B. Decrease and then increase.
    C. Decrease and then remain unchanged.

LO.c: Define spot rates and calculate the price of a bond using spot rates.

30. The following information is given for a bond LMN.
    Par value: $100
    Tenor: 3 years
    Coupon rate: 4%
    Coupon frequency: Annual
    Spot rates: 4.5% in year 1, 4.3% in year 2, 4.25% in year 3.
    Which of the following statements is most likely to be correct about the bond LMN?
    A. The price of the bond is equivalent to $98.7.
    B. The price of the bond is equivalent to $101.7.
    C. The yield to maturity is equivalent to 4.25%.

31. The following table consists of the spot rates for a 2 year bond issued by Jackal Enterprises.

Time-to Maturity	Spot Rate
1 year	2.5%
2 years	3.5%

Assume that the coupon rate of the bond is 4.5% and interest is paid annually. The price of this bond is most likely to be closest to:

A. $101.5.
B. $101.9.
C. $103.4.

The following information relates to Questions 32-34.

A bond named Galaxy has 4 years remaining till its maturity and is currently trading at US $102. Interest on the bond is paid on a semiannual basis based on a coupon rate of 5%. The bond is first callable in 2 years and on coupon dates after that date in accordance to the given table below.

End of Year	Call Price
2	101.5
3	101.0
4	100.0

32. Which of the following is most likely to be the bond's annual yield to maturity?

A. 2.22%.
B. 4.44%.
C. 6.66%.

33. Which of the following is most likely to be the bond's annual yield to first call?

A. 4.42%.
B. 4.66%.
C. 4.78%.

34. Which of the following is most likely to be the bond's annual yield to second call?

A. 4.26%.
B. 4.38%.
C. 4.59%.

35. An investor considers the purchase of a 2-year bond with a 6% coupon paid annually. Assuming the following spot rates, the price of the bond is *closest* to:

Spot rates:
1 year: 2%
2 years: 3%

A. $103.85.
B. $105.79.
C. $101.97.

The following information related to Questions 36-37

A 5 year bond with a par value of $1,000 offers a 7% coupon paid annually. The sequence of spot rates is given below:

1-year: 5%
2-year: 6%
3-year: 7%
4-year: 8%
5-year: 9%

36. Based on the given sequence of spot rates, the price of the bond is *closest* to:
    A. 932.99.
    B. 931.99.
    C. 933.99.

37. Based on the information, the yield to maturity of this bond is *closest* to:
    A. 8.51%.
    B. 9.51%.
    C. 8.71%.

38. Using the following US Treasury spot rates, the value of a 2-year, semi-annual pay, $100 par value Treasury bond with a 6% coupon rate is *closest* to:

Time Period	Spot Rate	Years
1	1.0%	0.5
2	1.5%	1.0
3	2.0%	1.5
4	2.0%	2.0

    A. $100.00.
    B. $108.50.
    C. $107.83.

39. Analyst 1: The arbitrage-free approach uses a single interest rate to discount all of a bond's cash flows. It views all cash flows of a bond as the same, regardless of the timing of the cash flows.
    Analyst 2: The arbitrage-free approach values a bond as a package of cash flows, with each cash flow viewed as a zero-coupon bond and each cash flow discounted at its own unique discount rate.
    Which analyst's statement is *most likely* correct?
    A. Analyst 1.
    B. Analyst 2.
    C. Neither of them.

40. Using the following US Treasury spot rates, the arbitrage-free value of a three-year $100 par value Treasury bond with a 6% semi-annual coupon rate is *closest* to:

Time Period	Spot Rate	Years

1	1%	0.5
2	1.5%	1
3	2%	1.5
4	2.25%	2
5	2.75%	2.5
6	3.5%	3

A. $100.
B. $104.61.
C. $107.34

LO.d: Describe and calculate the flat price, accrued interest, and the full price of a bond.
Based on the information given below answer question 41–43:

A 6% corporate bond is priced for settlement on 15 September 2015. The bond matures on 30 June 2018 and makes semiannual coupon payments on 30th June and 31st December. The bond is currently trading at 7.0% yield to maturity.

41. Based on the above information, the full price of the bond on the settlement date is *closest* to:
A. 973.36.
B. 987.47.
C. 975.52.

42. Based on above information, the accrued interest on the settlement date is *closest* to:
A. 12.55.
B. 22.55.
C. 15.55.

43. Based on the above information, the flat price of the bond on settlement date is *closest* to:
A. 973.36.
B. 974.92.
C. 972.52.

44. Which of the following is least likely to be equal to the clean price?
A. full price.
B. flat price.
C. quoted price.

The following information relates to Questions 45 and 46.
A Swiss 2-year corporate bond matures on 30 December 2015. The coupon rate is 5% paid semiannually on June 30 and December 30. The annual yield to maturity on 30 September 2014 is 4.25%. This bond uses the 30/360 convention.

45. Which of the following is most likely to be the full price of this bond on September 30, 2014?
A. CHF 102.15.

B. CHF 101.08.
C. CHF 103.89.

46. Which of the following is most likely to be the flat price of this bond on September 30, 2014?
A. CHF 100.90.
B. CHF 102.15.
C. CHF 100.00.

47. Bond dealers *most* often quote the:
A. flat price.
B. full price.
C. full price plus accrued interest.

48. Analyst 1: To calculate the full price, we must add accrued interest to the present value of the bond at the last coupon payment date.
Analyst 2: To calculate full price, we cannot add accrued interest to the present value of the bond at the last coupon date.
Which analyst's statement is *most likely* correct?
A. Analyst 1.
B. Analyst 2.
C. Neither of them.

LO.e: Describe matrix pricing.

49. The method to estimate the required yield to maturity of bonds that have low liquidity or that are not traded is *most likely* called:
A. mix pricing.
B. matrix pricing.
C. average pricing.

50. Jonathan, an analyst, has to find the value of an illiquid bond with tenor 3 years and an annual coupon rate of 3%. The following two bonds with similar credit quality have been identified.

Bond	Tenor	Annual coupon rate	Price
A	2 years	3.5%	$106.25
B	4 years	3.0%	$104.50

Assuming matrix pricing was used for valuation, the estimated price of the illiquid bond is most likely to be closest to:
A. $104.8.
B. $105.4.
C. $105.6.

51. Matrix pricing is most likely to be used for:
A. bonds which are not actively traded.
B. bonds with varying credit quality.

C. bonds with varying coupon rates.

52. Which of the following statements is *least accurate*?
    A. Matrix pricing is used for instruments that have low liquidity.
    B. Matrix pricing enable us to calculate precise trade prices by interpolating values of similar instruments arranged in a matrix format.
    C. Matrix pricing represents an educated guess and not an actual offer or trade price.

53. Current yield in market are as follows:
    4- year, U.S. treasury bond, YTM 2.5%
    4-year, A rated corporate bond, YTM 3.5%
    6-year, U.S. treasury bond, YTM 3.00%
    6-year, A rated corporate bond, YTM 4.75%
    5-year, U.S. treasury bond, YTM 2.75%
    Using matrix pricing, the yield on a 5 year A rated corporate bond is *closest* to:
    A. 3.125.
    B. 4.125.
    C. 5.125.

LO.f: Calculate and interpret yield measures for fixed-rate bonds, floating-rate notes, and money market instruments.

54. A firm has issued a bond with YTM of 6% on a semiannual basis. What yield should be used to compare it with an annual pay bond and a quarterly pay bond?
    A. For annual pay bond – 6.09%, for quarterly pay bond – 5.96%.
    B. For annual pay bond – 6.15%, for quarterly pay bond – 5.90%.
    C. For annual pay bond – 615%, for quarterly pay bond – 6.20%.

55. Statement 1: When interest is not paid on the due date and it is paid on the day after the due date, the yield is called true yield and it is generally lower than the street convention yields.
    Statement 2: When interest is not paid on the due date and it is paid before that date, the yield is called true yield and it is generally higher than the street convention yield.
    Which statement is *most likely* correct?
    A. Statement 1.
    B. Statement 2.
    C. Neither of them.

56. A three year floating-rate note pays six-month LIBOR plus 1.80%. It is priced at 98 per 100 of par value. Given that the six month LIBOR is constant at 3.4%, the interest payment each period per 100 of par value is most likely to be:
    A. 2.60.
    B. 1.69.
    C. 2.73.

57. Which of the following is least likely to be a difference in yield measures between money market and the bond market?

A. Bond yield to maturities are annualized and compounded; money market yield measures are annualized but not compounded.
B. Bond yield to maturities usually are stated for a common periodicity for all times to maturity; money market instruments have different periodicities for annual rate.
C. Bond yield to maturity can be calculated using formulae programmed in financial calculator; money market yields can be calculated using standard time value of money analysis.

58. Which of the following is most likely to be the price of a 96-day T-Bill with a face value of USD 1 million quoted at a discount rate of 2.75%? Assume a 360 day year.
A. $992,667.
B. $992,720.
C. $992,791.

59. The following information is available for a banker's acceptance.
PV = CHF1, 000,000
FV = CHF1, 250,000
Number of days between settlement and maturity = 182
Total number of days in the year = 365.
Which of the following is most likely to be the add-on-rate stated as an annual percentage rate?
A. 40.2%.
B. 50.1%.
C. 56.4%.

60. The following table gives details of three 180-day money market instruments.

Instrument	Quotation Basis	Number of days in a year	Quoted Rate
A	Add-on Rate	360	5.44%
B	Discount Rate	360	5.45%
C	Discount Rate	365	5.46%

Which of the following money market instruments is most likely to offer the highest rate of return? Assume that the credit risk is same.
A. Instrument A.
B. Instrument B.
C. Instrument C.

61. Maxtax Inc. has issued semiannual $1,000 par value Floating Rate Note with 4 years to maturity, the reference rate is 180-day LIBOR and the quoted margin is 75 basis points. 180-day LIBOR is currently quoted at 5% and the margin for discount is 91 basis points. What is the *most likely* value of this FRN?
A. 994.37.
B. 995.39.
C. 991.37.

62. A negotiable certificate of deposit with 90 days to maturity is quoted with an add-on yield of 1.6% based on 365 days a year. Face value of this CD is $5 million. The bond equivalent yield and the amount payable on maturity for this certificate of deposit is *closest* to:
    A. BEY = 1.6% and maturity value is $50,19,725.
    B. BEY = 2.01% and maturity value is $50,20,952.
    C. BEY = 1.8% and maturity value is $50,15,563.

LO.g: Define and compare the spot curve, yield curve on coupon bonds, par curve, and forward curve.

63. The *most* common type of yield curve shape is the:
    A. upward sloping yield curve.
    B. downward sloping yield curve.
    C. flat yield curve.

64. Which of the following curves is least likely to be constructed from numerous yield to maturity of zero coupon bonds?
    A. Par curve.
    B. Strip curve.
    C. Spot curve.

65. The yield curve constructed from a sequence of yields-to-maturities on zero coupon bonds is *least likely* the:
    A. strip curve.
    B. zero curve.
    C. par curve.

66. A sequence of yield to maturities such that each bond is priced at par value is the:
    A. spot curve.
    B. zero curve.
    C. par curve.

67. Analyst 1: A forward curve is a series of forward rates, each having the same time frame.
    Analyst 2: A forward curve is a series of forward rates, each having incremental time frames.
    Which analyst's statement is *most likely* correct?
    A. Analyst 1.
    B. Analyst 2.
    C. Neither of them.

LO.h: Define forward rates and calculate spot rates from forward rates, forward rates from spot rates, and the price of a bond using forward rates.

68. What does the notation 5y3y *most likely* represent?
    A. 3 year loan to be made after 5 years.
    B. 5 year loan to be made after 3 years.
    C. 5 year loan to be made at 3 year yield.

69. Which of the following statements is *most accurate*?
    A. Implied spot rates can be calculated as arithmetic average of forward rates.
    B. Implied spot rates can be calculated as geometric average of forward rates.
    C. Implied forward rates can be calculated as geometric average of spot rates.

70. An analyst wants to find out 1 year forward rate 2 years from now. Currently the 1 year spot rate is 3% and the spot rate for 2 years is 5% while 3 year spot rate is 9%. The 1 year forward rate 2 years from now is *closet* to:
    A. 15.46%.
    B. 19.46%.
    C. 17.46%.

71. John wants to value an annual coupon pay bond with 3 years maturity and 7% coupon. The bond has a par value of $1,000. Current spot rate is 5%, 1 year forward rate 1 year from now is 6% and 1 year forward rate 2 years from now is 7%. The value of this annual coupon pay bond is *closest* to:
    A. $1025.04.
    B. $1018.34.
    C. $1028.34.

72. Assume the following annual forward rates were calculated from the yield curve.

Time Period	**Forward Rate**
0y1y	0.50%
1y1y	0.75%
2y1y	1.00%
3y1y	1.25%
4y1y	1.75%

    The four-year spot rate is *closest* to:
    A. 0.88%.
    B. 1.05%.
    C. 1.75%.

LO.i: Compare, calculate, and interpret yield spread measures.

73. What is the *most likely* basis for calculating I-spread?
    A. Interest rate swap in the same currency and same tenure as the bond.
    B. Interest rate on comparable corporate bond with same tenure and same credit rating.
    C. Interest rate on highest rated bonds in the industry with same tenure.

74. The yield spread in basis points over an actual or interpolated government bond is known as the:
    A. I-spread.
    B. G-spread.
    C. Z-spread.

75. Which of the following is least likely to effect the spread component of a specific bond's yield-to-maturity?
    A. The expected inflation.
    B. The quality of credit rating.
    C. The tax status.

76. The constant spread added to each spot rate such that the present value of the cash flows matches the price of the bond is known as the:
    A. I-spread.
    B. G-spread.
    C. Z-spread.

77. In case of callable bonds, the:
    A. OAS < Z-spread.
    B. OAS = Z-spread.
    C. OAS > Z-spread.

78. In case of putable bonds, the:
    A. OAS < Z-spread.
    B. OAS = Z-spread.
    C. OAS > Z-spread.

79. The z-spread and the option adjusted spread for a bond will be the same if the:
    A. bond has a call option.
    B. bond has a put option.
    C. bond does not have an embedded option.

Solutions

1. B is correct. Using a financial calculator, compute the present value as:
   N = 5, I/Y = 9%, PMT = $9, FV = $100, CPT PV = ($100).
   Since the coupon rate is equal to the market discount rate, the bond is priced at par.

2. A is correct. Using a financial calculator, compute the present value as:
   N = 4 * 2 = 8, I/Y = 12/2 = 6%, PMT = $10/2 = 5 and FV = $100, CPT PV = ($93.79).
   Since the coupon rate is lower than the market rate, the bond is priced at discount.

3. C is correct.
   $$\text{Price of bond } = \frac{6}{(1.04)^1} + \frac{6}{(1.04)^2} + \frac{6}{(1.04)^3} + \frac{106}{(1.04)^4} \approx 107.3$$

4. C is correct. PMT = 3, FV = 100, r = 2%, N = 12, CPT, PV = $ 110.5

5. C is correct. Using a financial calculator, compute the present value as:
   N = 3 * 4 = 12, I/Y = 5/4 = 1.25%, PMT = $6/4 = 1.5, and FV = $100, CPT PV = ($102.76).
   Since the coupon rate is higher than the market rate, the bond is trading at a premium.

6. B is correct. $\text{Value of zero} - \text{coupon bond } = \text{Face value}/(1 + \text{coupon rate})^{N}$
   $= 500/(1.05)^{10} = \$306.96$

7. C is correct. FV = 100; PMT = 0; 1/Y = 15/2 = 7.5; N = 20 * 2 = 40; CPT PV = $5.54.

8. A is correct. A bond is priced at premium when the coupon rate is greater than the market discount rate. A bond is priced at discount when the coupon rate is less than the market discount rate.

9. B is correct. If coupon rate is equal to market discount rate, the bond is priced at par. If coupon rate is more than the market discount rate, the bond is priced at a premium. If coupon rate is less than the market discount rate, the bond is priced at discount.

10. B is correct. The price-yield relationship for an option-free bond is a convex relationship.

11. C is correct. When the coupon rate is greater than the market discount rate, the bond is priced at a premium above par value.

12. A is correct. Assuming that the discount rate does not change, a bond's value:
    - decreases over time if the bond is selling at a premium.
    - increases over time if the bond is selling at a discount.
    - is unchanged if the bond is selling at par value.

13. B is correct. All else equal, the longer the term to maturity the greater the price volatility.

14. B is correct. All else equal, the lower the coupon rate, the greater the price volatility.

15. A is correct. The yield to maturity is known as implied market discount rate, and not implied coupon rate. It can also be called yield to redemption or the internal rate of return.

16. A is correct.
$$\text{Price of zero coupon bond} = \frac{100}{(1+\text{r})^{\text{N}}} = \frac{100}{(1+0.035)^{12}} = \$66.2$$

17. B is correct. According to coupon effect, a higher coupon bond has a smaller percentage price change than a lower coupon bond when the market discount rates change by the same amount. According to the maturity effect, a shorter term bond generally has a smaller percentage price change than a longer term bond when the market discount rates change by the same amount. Therefore, Bond B will experience a smaller change than Bond A (coupon effect) and a smaller change than Bond C (maturity effect).

18. B is correct.
FV = S$100, PV = -S$104.8, PMT = S$2.4, N = 3, CPT 1/Y. I/Y = 0.775%

19. C is correct.
$$\text{PV} = \frac{\text{FV}}{(1+\text{r})^{\text{N}}} = \frac{100}{(1+\text{r})^{12*4}}$$
$$80 = \frac{100}{(1+\text{r})^{12*4}}$$
$\text{r} = 1.00466 - 1 = 0.00466$
Annual r = 0.00466 * 12 = 5.59%

20. C is correct. The true yield is lower than the street convention because weekends and holidays delay the time to payment.

21. B is correct. A is incorrect because the lowest of the sequence of yields-to-call and yields-to maturity is known as the yield-to-worst. C is incorrect because the value of an embedded call option is added to the flat price of bond to get the option-adjusted price.

22. C is correct. Statement I is correct. Statement II is incorrect because for the same coupon rate, a longer term bond has a greater percentage price change than a shorter term bond if the market discount rates change by the same amount. Statement III is incorrect because for the same time-to-maturity, a lower coupon bond has a greater percentage price change than a higher coupon bond when market discount rates change by the same amount.

23. B is correct. For a greater yield to maturity for Bond A, it should be illiquid in comparison to Bond B.

24. A is correct. Using a financial calculator, calculate YTM as:

N = 30, PV = ($12,523), PMT = $500, FV = $10,000, CPT I/Y = 3.61%.

25. A is correct. Statement 1 is correct. The percentage decrease in the price of a bond for a given increase in yield is smaller than the percentage increase in the price of a bond when yield decreases by same amount.

26. C is correct. The relationship between bond prices and market discount rate is not linear. The percentage price change is greater in absolute value when the market discount rate goes down than when it goes up by the same amount (the convexity effect). If a 100 basis point increase in the market discount rate will cause the price of the bond to decrease by 2%, then a 100 basis point decrease in the market discount rate will cause the price of the bond to increase by an amount more than 2%.

27. A is correct. Analyst 1 is correct. Constant-yield price trajectory states that the bond price converges to par value as it reaches maturity, if the yield to maturity is constant.

28. B is correct. If the discount rate increases to 6.5% from 4.5%, the price of a bond decreases. At a discount rate of 6.5%, (more than the coupon rate of 5%) the bond sells at a discount to face value. As a discount bond approaches maturity, it will increase in price over time until it reaches par at maturity.

29. A is correct. If the discount rate decreases to 4.5% from 6.5%, the price of a bond increases. At a discount rate of 4.5% (less than the coupon rate of 5%) the bond sells at a premium to face value. As a premium bond approaches maturity, it will decrease in price over time until it reaches par at maturity.

30. C is correct.

$$\text{Price of bond} = \frac{4}{(1.045)^1} + \frac{4}{(1.043)^2} + \frac{104}{(1.0425)^3} \approx \$99.3$$

FV = \$100, PV = -\$99.3, PMT = \$4, N = 3, YTM ≈ 4.25%

31. B is correct.

$$\text{Price} = \frac{4.5}{(1+0.025)^1} + \frac{(104.5)}{(1+0.035)^2} = 4.39 + 97.55 = 101.94$$

32. B is correct.
PV = 102, FV = 100, PMT = 2.5, N = 8 thus 1/Y = 2.22%. Annualized 4.44%

33. B is correct.
PV = 102, FV = 101.5, PMT = 2.5, N = 4, thus 1/Y = 2.33%. Annualized 4.66%

34. C is correct.
PV = 102, FV = 101, PMT = 2.5, N = 6, thus 1/Y = 2.296%. Annualized 4.59%

35. B is correct.

$$\frac{6}{1.02} + \frac{106}{1.03^2} = 105.79$$

36. A is correct.
$$\frac{70}{(1.05)} + \frac{70}{(1.06)^2} + \frac{70}{(1.07)^3} + \frac{70}{(1.08)^4} + \frac{1070}{(1.09)^5}$$
= 66.67 + 62.30 + 57.14 + 51.45 + 695.43
= 932.99

37. C is correct. We first compute the PV of this bond as shown in the question above. Using this information we can calculate the YTM for this bond.
N = 5, PV = ($932.99), PMT = $70, FV = $1000, CPT I/Y = 8.71%

38. C is correct. Note that we have a coupon payment of 3 at end of each period. The final payment at the end of year two is 103 (coupon + par value). Each payment needs to be discounted at the relevant spot rate:
The value of the bond is: $\frac{3}{1+\frac{0.01}{2}} + \frac{3}{\left(1+\frac{.015}{2}\right)^2} + \frac{3}{\left(1+\frac{0.02}{2}\right)^3} + \frac{103}{\left(1+\frac{0.02}{2}\right)^4}$
= 107.83

39. B is correct. Analyst 2 is correct. The approach described by analyst 1 is the traditional approach, not the arbitrage-free approach.

40. C is correct. The value of the bond is:
$$\frac{3}{\left(1+\frac{.01}{2}\right)^1} + \frac{3}{\left(1+\frac{.015}{2}\right)^2} + \frac{3}{\left(1+\frac{.02}{2}\right)^3} + \frac{3}{\left(1+\frac{.0225}{2}\right)^4} + \frac{3}{\left(1+\frac{.0275}{2}\right)^5} + \frac{103}{\left(1+\frac{.035}{2}\right)^6} = 107.34$$

41. B is correct. We first calculate the PV of the bond as of the last coupon payment date and then take its future value on settlement date.
N = 6, I/Y = 3.5%, PMT = 30, FV = $1,000, CPT PV = 973.36
Days between 30th June and 31st December = 184 days
Days between 30th June and 15th September = 77 days
Full price = 973.36 * $(1.035)^{77/184}$ = $987.47

42. A is correct. Based on the given data accrued interest = 30 * (77/184) = $12.55

43. B is correct. Flat price = Full price – accrued interest
= 987.47 – 12.55 = $974.92

44. A is correct. The clean price of a bond is equal to the quoted price as well as flat price.

45. A is correct.
Step 1: Calculate PV on previous coupon date
FV = CHF100, PMT = 2.5, N = 3, I/Y = 4.25/2, therefore PV = CHF101.08
Step 2: Compound forward based on number of days.
PVFull = $101.08 * (1.02125)^{\frac{90}{180}}$ = CHF102.15

46. A is correct.
Step 1:

Calculate Accrued Interest
AI = $\frac{90}{180} * 2.5$ = CHF1.25
Step 2:
Calculate PVFlat
PVFlat= PVFull – AI = 102.15 – 1.25 = 100.90

47. A is correct. Bond dealers usually quote the flat price to avoid misleading investors about the market price trend for the bond. If the full price were to be quoted by dealers, investors would see the price rise day after day even if the yield-to-maturity did not change. That is because the amount of accrued interest increases each day. Then after the coupon payment is made the quoted price would drop dramatically. Using the flat price for quotation avoids that misrepresentation.

48. B is correct. Accrued interest is not a discounted value it will give us a wrong value of full price if added to the present value.

49. B is correct. Matrix pricing is the method used to estimate the yield to maturity of thinly traded or not traded bonds.

50. C is correct.
Step 1:
Calculate YTM on Bonds A and B.
FV = 100, PV = -106.25, PMT = 3.5, N = 2, CPT I/Y; I/Y = 0.36%
FV = 100, PV = -104.50, PMT = 3, N = 4, thus 1/Y = 1.82%
Step 2:
Calculate average YTM
Average YTM = $\frac{0.36 + 1.82}{2}$ = 1.09%
Step 3: Calculate estimated price of illiquid bond
FV = 100, PMT = 3, N = 3, 1/Y = 1.09%, PV = $105.6

51. A is correct. Matrix pricing is used to estimate the price of illiquid bonds or bonds that are not traded actively.

52. B is correct. Matrix pricing does not give us precise values; it represents an educated guess.

53. B is correct.

The spread on 4 year bonds = 3.5 – 2.5 = 1.00%
The spread on 6 year bonds = 4.75 – 3.00 = 1.75%
The average spread = $\frac{1.00 + 1.75}{2}$ = 1.375%
Adding this spread to 5-year U.S. Treasury bond yield
= 2.75 + 1.375 = 4.125%

54. A is correct. For annual pay bond: (1.03)^2 – 1 = 6.09%
For quarterly pay bond:

$(1.03)^{0.5} - 1 = 1.49\%$ and for quarterly basis 1.49 * 4 = 5.96%

55. A is correct. Statement 1 is correct. When interest is not paid on the due date and it is paid on the day after the due date, the yield is called true yield and it is generally lower than the street convention yields.

56. A is correct.

$$\text{Interest payment each period} = \frac{\big((\text{Index} + \text{QM}) * \text{FV}\big)}{\text{m}} = \frac{(0.018 + 0.034) * \ 100}{2} = 2.603$$

57. C is correct. Money market instruments often are quoted using nonstandard interest rates and require different pricing equations than those used for bonds.

58. A is correct.

$$\text{PV} = \text{FV} * \left[1 - \left(\frac{\text{Days}}{\text{Days in Year}}\right) * \text{Discount Rate}\right]$$

$$\text{PV} = 1{,}000{,}000 * \left[1 - \left(\frac{96}{360}\right) * 0.0275\right] = \$992{,}667$$

59. B is correct.

$$\text{PV} = \frac{\text{FV}}{\left(1 + \frac{\text{Days}}{\text{Year}} * \text{AOR}\right)}$$

$$1{,}000{,}000 = \frac{1{,}250{,}000}{\left(1 + \frac{182}{365} * \text{AOR}\right)}$$

$$\text{AOR} = 50.1\%$$

60. B is correct.
We solve this problem by calculating the bond equivalent yield for each instrument. This is also called the AOR with a 365 day year.
For A, we have the AOR but this is for 360 days. We need the rate assuming a 365 day year. This can be done using a 2-step process:
Step 1: Determine redemption amount
PV = 100, Days = 180, Year = 360, AOR = 0.0544.

$$\text{FV} = 100 + \left[100 * \frac{180}{360}\ 0.0544\right] = 102.72$$

Step 2: Determine bond equivalent yield

$$\text{AOR} = \left(\frac{365}{180}\right) * \left(\frac{102.72 - 100}{100}\right) = 5.52\%$$

For B, we have the discount rate assuming a 360 day year. Convert to AOR with 365 days:
Step 1: Determine price per 100 par value
FV = 100, Days = 180, Year = 360, DR = 0.0545

$$\text{PV} = 100 * \left[1 - \left(\frac{180}{360}\right) * 0.0545\right] = 97.275$$

Step 2: Determine bond equivalent yield

$$\text{AOR} = \left(\frac{365}{180}\right) * \left(\frac{100 - 97.275}{97.275}\right) = 5.68\%$$

For C, we have the discount rate assuming a 365 day rate. Convert to AOR with 365 days:

Step 1: Determine price per 100 par value

FV = 100, Days = 180, Year = 365, DR = 0.0546

$$\text{PV} = 100 * \left[1 - \left(\frac{180}{365}\right) * 0.0546\right] = 97.31$$

Step 2: Determine bond equivalent yield

$$\text{AOR} = \left(\frac{365}{180}\right) * \left(\frac{100 - 97.31}{97.31}\right) = 5.61\%$$

Thus, the highest bond equivalent yield is for Instrument B.

61. A is correct. Coupon rate for this FRN = $\frac{\text{180−day LIBOR + quoted margin}}{2}$

$= \frac{5 + 0.75}{2} = \frac{5.75}{2} = 2.88\%$

Discount rate = $\frac{\text{180−day LIBOR + margin for discount}}{2}$

$= \frac{5 + 0.91}{2} = \frac{5.91}{2} = 2.96\%$

Value of Fixed Rate Note

N = 8, PMT = 28.8, I/Y = 2.96%, FV = $1,000, CPT PV = 994.37

62. A is correct. The add-on interest for 90 day CD is $1.6 * \frac{90}{365} = 0.3945\%$

Maturity value = $5 million $* (1 + 0.003945) = \$50,19,725.$

The BEY is the same as quoted yield as this is quoted on the basis of 365 day a year.

63. A is correct. The most common type of yield curve is the upward sloping yield curve. The longer maturity issues have higher yields than shorter maturity issues.

64. A is correct. The spot zero, or strip curve is a sequence of yields to maturity on zero coupon bonds. However, a par curve is a sequence of yields to maturity such that each bond is priced at par value.

65. C is correct. A spot curve also called a strip curve or zero curve is a yield curve constructed from a sequence of yields-to-maturities on zero coupon bonds.

66. C is correct. A sequence of yields-to maturities such that each bond is priced at par value is called the par curve.

67. A is correct. A forward curve is a series of forward rates, each having the same time frame.

68. A is correct. The forward quote of 5y3y indicates the rate of 3 year loan to be made after 5 years.

69. B is correct. Implied spot rates are geometric average of forward rates.

70. C is correct. 1 year forward rate 2 years from now:

$$(1 + 2y1y) = \frac{(1.09)^3}{(1.05)^2}$$

$$\frac{1.2950}{1.1025} - 1$$

$$= 17.46\%$$

71. C is correct. Value of the bond:

$$\frac{70}{(1.05)} + \frac{70}{(1.06)(1.05)} + \frac{1070}{(1.05)(1.06)(1.07)}$$

$$= 66.67 + 62.8931 + 898.4726$$

$$= 1028.34$$

72. A is correct. The four-year spot rate can be computed as:
$Z_4 = [(1.005) * (1.0075) * (1.01) * (1.0125)]^{1/4} - 1 = 0.8746\%$

73. A is correct. I-spread uses interest rate swaps in the same currency and with the same tenure as benchmark.

74. B is correct. The yield spread in basis points over an actual or interpolated government bond is known as the G-spread.

75. A is correct. The spread is affected by micro economic factors. Therefore macroeconomic factors like expected inflation are least likely to effect the spread component of the bond's yield to maturity.

76. C is correct. The constant spread added to each spot rate such that the present value of the cash flows matches the price of the bond is known as the Z-spread.

77. A is correct. OAS = Z-spread – Option value. The option value is positive since the options are a detriment to bondholders.

78. C is correct. OAS = Z-spread – Option value. The option value is negative since the options are a benefit to bondholders.

79. C is correct. Z-spread and option adjusted spread will be one and the same when the bonds do not have any embedded option.