

CHAPTER 7

BONDS AND THEIR VALUATION

(Difficulty: E = Easy, M = Medium, and T = Tough)

Multiple Choice: Conceptual

Easy:

Interest rates

Answer: e Diff: E

1. One of the basic relationships in interest rate theory is that, other things held constant, for a given change in the required rate of return, the _____ the time to maturity, the _____ the change in price.
- a. longer; smaller.
 - b. shorter; larger.
 - c. longer; greater.
 - d. shorter; smaller.
 - e. Statements c and d are correct.

Interest rates and bond prices

Answer: c Diff: E

2. Assume that a 10-year Treasury bond has a 12 percent annual coupon, while a 15-year Treasury bond has an 8 percent annual coupon. The yield curve is flat; all Treasury securities have a 10 percent yield to maturity. Which of the following statements is most correct?
- a. The 10-year bond is selling at a discount, while the 15-year bond is selling at a premium.
 - b. The 10-year bond is selling at a premium, while the 15-year bond is selling at par.
 - c. If interest rates decline, the price of both bonds will increase, but the 15-year bond will have a larger percentage increase in price.
 - d. If the yield to maturity on both bonds remains at 10 percent over the next year, the price of the 10-year bond will increase, but the price of the 15-year bond will fall.
 - e. Statements c and d are correct.

Interest rates and bond prices

Answer: c Diff: E

3. A 12-year bond has an annual coupon rate of 9 percent. The coupon rate will remain fixed until the bond matures. The bond has a yield to maturity of 7 percent. Which of the following statements is most correct?
- a. The bond is currently selling at a price below its par value.
 - b. If market interest rates decline today, the price of the bond will also decline today.
 - c. If market interest rates remain unchanged, the bond's price one year from now will be lower than it is today.
 - d. All of the statements above are correct.
 - e. None of the statements above is correct.

Interest rates and bond prices**Answer: d Diff: E**

4. A 10-year Treasury bond has an 8 percent coupon. An 8-year Treasury bond has a 10 percent coupon. Both bonds have the same yield to maturity. If the yields to maturity of both bonds increase by the same amount, which of the following statements is most correct?
- a. The prices of both bonds will increase by the same amount.
 - b. The prices of both bonds will decrease by the same amount.
 - c. The prices of the two bonds will remain the same.
 - d. Both bonds will decline in price, but the 10-year bond will have a greater percentage decline in price than the 8-year bond.
 - e. Both bonds will decline in price, but the 8-year bond will have a greater percentage decline in price than the 10-year bond.

Interest vs. reinvestment rate risk**Answer: e Diff: E**

5. Which of the following statements is most correct?
- a. All else equal, long-term bonds have more interest rate risk than short-term bonds.
 - b. All else equal, high-coupon bonds have more reinvestment rate risk than low-coupon bonds.
 - c. All else equal, short-term bonds have more reinvestment rate risk than do long-term bonds.
 - d. Statements a and c are correct.
 - e. All of the statements above are correct.

Interest vs. reinvestment rate risk**Answer: c Diff: E**

6. Which of the following statements is most correct?
- a. Relative to short-term bonds, long-term bonds have less interest rate risk but more reinvestment rate risk.
 - b. Relative to short-term bonds, long-term bonds have more interest rate risk and more reinvestment risk.
 - c. Relative to coupon-bearing bonds, zero coupon bonds have more interest rate risk but less reinvestment rate risk.
 - d. If interest rates increase, all bond prices will increase, but the increase will be greatest for bonds that have less interest rate risk.
 - e. One advantage of zero coupon bonds is that you don't have to pay any taxes until you sell the bond or it matures.

Price risk**Answer: a Diff: E**

7. Which of the following bonds will have the greatest percentage increase in value if all interest rates decrease by 1 percent?
- a. 20-year, zero coupon bond.
 - b. 10-year, zero coupon bond.
 - c. 20-year, 10 percent coupon bond.
 - d. 20-year, 5 percent coupon bond.
 - e. 1-year, 10 percent coupon bond.

Callable bond**Answer: a Diff: E**

8. Which of the following events would make it more likely that a company would choose to call its outstanding callable bonds?
- a. A reduction in market interest rates.
 - b. The company's bonds are downgraded.
 - c. An increase in the call premium.
 - d. Statements a and b are correct.
 - e. Statements a, b, and c are correct.

Call provision**Answer: b Diff: E**

9. Other things held constant, if a bond indenture contains a call provision, the yield to maturity that would exist without such a call provision will generally be _____ the YTM with a call provision.
- a. Higher than.
 - b. Lower than.
 - c. The same as.
 - d. Either higher or lower (depending on the level of the call premium) than.
 - e. Unrelated to.

Bond coupon rate**Answer: c Diff: E**

10. All of the following may serve to reduce the coupon rate that would otherwise be required on a bond issued at par, except a
- a. Sinking fund.
 - b. Restrictive covenant.
 - c. Call provision.
 - d. Change in rating from Aa to Aaa.
 - e. None of the statements above. (All may reduce the required coupon rate.)

Bond concepts**Answer: a Diff: E**

11. Which of the following statements is most correct?
- a. All else equal, if a bond's yield to maturity increases, its price will fall.
 - b. All else equal, if a bond's yield to maturity increases, its current yield will fall.
 - c. If a bond's yield to maturity exceeds the coupon rate, the bond will sell at a premium over par.
 - d. All of the statements above are correct.
 - e. None of the statements above is correct.

Bond concepts**Answer: c Diff: E**

12. Which of the following statements is most correct?
- a. If a bond's yield to maturity exceeds its annual coupon, then the bond will be trading at a premium.
 - b. If interest rates increase, the relative price change of a 10-year coupon bond will be greater than the relative price change of a 10-year zero coupon bond.
 - c. If a coupon bond is selling at par, its current yield equals its yield to maturity.
 - d. Statements a and c are correct.
 - e. None of the statements above is correct.

Bond concepts**Answer: e Diff: E**

13. A 10-year corporate bond has an annual coupon payment of 9 percent. The bond is currently selling at par (\$1,000). Which of the following statements is most correct?
- a. The bond's yield to maturity is 9 percent.
 - b. The bond's current yield is 9 percent.
 - c. If the bond's yield to maturity remains constant, the bond's price will remain at par.
 - d. Statements a and c are correct.
 - e. All of the statements above are correct.

Bond concepts**Answer: a Diff: E**

14. A 15-year bond with a face value of \$1,000 currently sells for \$850. Which of the following statements is most correct?
- a. The bond's yield to maturity is greater than its coupon rate.
 - b. If the yield to maturity stays constant until the bond matures, the bond's price will remain at \$850.
 - c. The bond's current yield is equal to the bond's coupon rate.
 - d. Statements b and c are correct.
 - e. All of the statements above are correct.

Bond concepts**Answer: d Diff: E**

15. A Treasury bond has an 8 percent annual coupon and a yield to maturity equal to 7.5 percent. Which of the following statements is most correct?
- a. The bond has a current yield greater than 8 percent.
 - b. The bond sells at a price above par.
 - c. If the yield to maturity remains constant, the price of the bond is expected to fall over time.
 - d. Statements b and c are correct.
 - e. All of the statements above are correct.

Bond concepts**Answer: a Diff: E**

16. You are considering investing in three different bonds. Each bond matures in 10 years and has a face value of \$1,000. The bonds have the same level of risk, so the yield to maturity is the same for each. Bond A has an 8 percent annual coupon, Bond B has a 10 percent annual coupon, and Bond C has a 12 percent annual coupon. Bond B sells at par. Assuming that interest rates are expected to remain at their current level for the next 10 years, which of the following statements is most correct?
- a. Bond A sells at a discount (its price is less than par), and its price is expected to increase over the next year.
 - b. Bond A's price is expected to decrease over the next year, Bond B's price is expected to stay the same, and Bond C's price is expected to increase over the next year.
 - c. Since the bonds have the same yields to maturity, they should all have the same price, and since interest rates are not expected to change, their prices should all remain at their current levels until the bonds mature.
 - d. Bond C sells at a premium (its price is greater than par), and its price is expected to increase over the next year.
 - e. Statements b and d are correct.

Bond concepts**Answer: d Diff: E**

17. An investor is considering buying one of two bonds issued by Carson City Airlines. Bond A has a 7 percent annual coupon, whereas Bond B has a 9 percent annual coupon. Both bonds have 10 years to maturity, face values of \$1,000, and yields to maturity of 8 percent. Assume that the yield to maturity for both of the bonds will remain constant over the next 10 years. Which of the following statements is most correct?
- a. Bond A has a higher price than Bond B today, but one year from now the bonds will have the same price as each other.
 - b. Bond B has a higher price than Bond A today, but one year from now the bonds will have the same price as each other.
 - c. Both bonds have the same price today, and the price of each bond is expected to remain constant until the bonds mature.
 - d. One year from now, Bond A's price will be higher than it is today.
 - e. Bond A's current yield (not to be confused with its yield to maturity) is greater than 8 percent.

Bond concepts**Answer: c Diff: E**

18. A 10-year bond with a 9 percent annual coupon has a yield to maturity of 8 percent. Which of the following statements is most correct?
- a. The bond is selling at a discount.
 - b. The bond's current yield is greater than 9 percent.
 - c. If the yield to maturity remains constant, the bond's price one year from now will be lower than its current price.
 - d. Statements a and b are correct.
 - e. None of the statements above is correct.

Bond concepts**Answer: a Diff: E N**

19. Which of the following statements is most correct?
- a. Long-term bonds have more interest rate price risk, but less reinvestment rate risk than short-term bonds.
 - b. Bonds with higher coupons have more interest rate price risk, but less reinvestment rate risk than bonds with lower coupons.
 - c. If interest rates remain constant for the next five years, the price of a discount bond will remain the same for the next five years.
 - d. Statements b and c are correct.
 - e. All of the statements above are correct.

Bond concepts**Answer: d Diff: E N**

20. Which of the following statements is most correct?
- a. If a bond is selling at par value, its current yield equals its yield to maturity.
 - b. If a bond is selling at a discount to par, its current yield will be less than its yield to maturity.
 - c. All else equal, bonds with longer maturities have more interest rate (price) risk than do bonds with shorter maturities.
 - d. All of the statements above are correct.
 - e. None of the statements above is correct.

Bond yield**Answer: a Diff: E**

21. A 10-year bond pays an annual coupon. The bond has a yield to maturity of 8 percent. The bond currently trades at a premium--its price is above the par value of \$1,000. Which of the following statements is most correct?
- a. If the yield to maturity remains at 8 percent, then the bond's price will decline over the next year.
 - b. The bond's current yield is less than 8 percent.
 - c. If the yield to maturity remains at 8 percent, then the bond's price will remain the same over the next year.
 - d. The bond's coupon rate is less than 8 percent.
 - e. If the yield to maturity increases, then the bond's price will increase.

Bond yields and prices**Answer: d Diff: E**

22. You are considering two Treasury bonds. Bond A has a 9 percent annual coupon, and Bond B has a 6 percent annual coupon. Both bonds have a yield to maturity of 7 percent. Assume that the yield to maturity is expected to remain at 7 percent. Which of the following statements is most correct?
- a. If the yield to maturity remains at 7 percent, the price of both bonds will increase by 7 percent per year.
 - b. If the yield to maturity remains at 7 percent, the price of both bonds will increase over time, but the price of Bond A will increase by more.
 - c. If the yield to maturity remains at 7 percent, the price of both bonds will remain unchanged.
 - d. If the yield to maturity remains at 7 percent, the price of Bond A will decrease over time, but the price of Bond B will increase over time.
 - e. If the yield to maturity remains at 7 percent, the price of Bond B will decrease over time, but the price of Bond A will increase over time.

Sinking fund provision**Answer: e Diff: E**

23. Which of the following statements is most correct?
- a. Sinking fund provisions do not require companies to retire their debt; they only establish "targets" for the company to reduce its debt over time.
 - b. Sinking fund provisions sometimes work to the detriment of bondholders--particularly if interest rates have declined over time.
 - c. If interest rates have increased since the time a company issues bonds with a sinking fund provision, the company is more likely to retire the bonds by buying them back in the open market, as opposed to calling them in at the sinking fund call price.
 - d. Statements a and b are correct.
 - e. Statements b and c are correct.

Sinking fund provision**Answer: d Diff: E**

24. Which of the following statements is most correct?
- a. Retiring bonds under a sinking fund provision is similar to calling bonds under a call provision in the sense that bonds are repurchased by the issuer prior to maturity.
 - b. Under a sinking fund, bonds will be purchased on the open market by the issuer when the bonds are selling at a premium and bonds will be called in for redemption when the bonds are selling at a discount.
 - c. The sinking fund provision makes a debt issue less risky to the investor.
 - d. Statements a and c are correct.
 - e. All of the statements above are correct.

Types of debt**Answer: e Diff: E**

25. Which of the following statements is most correct?

- a. Junk bonds typically have a lower yield to maturity relative to investment grade bonds.
- b. A debenture is a secured bond that is backed by some or all of the firm's fixed assets.
- c. Subordinated debt has less default risk than senior debt.
- d. All of the statements above are correct.
- e. None of the statements above is correct.

Medium:**Bond yield****Answer: b Diff: M**

26. Which of the following statements is most correct?

- a. Rising inflation makes the actual yield to maturity on a bond greater than the quoted yield to maturity, which is based on market prices.
- b. The yield to maturity for a coupon bond that sells at its par value consists entirely of an interest yield; it has a zero expected capital gains yield.
- c. On an expected yield basis, the expected capital gains yield will always be positive because an investor would not purchase a bond with an expected capital loss.
- d. The market value of a bond will always approach its par value as its maturity date approaches. This holds true even if the firm enters bankruptcy.
- e. None of the statements above is correct.

Bond yield**Answer: c Diff: M**

27. Which of the following statements is most correct?

- a. The current yield on Bond A exceeds the current yield on Bond B; therefore, Bond A must have a higher yield to maturity than Bond B.
- b. If a bond is selling at a discount, the yield to call is a better measure of return than the yield to maturity.
- c. If a coupon bond is selling at par, its current yield equals its yield to maturity.
- d. Statements a and b are correct.
- e. Statements b and c are correct.

Price risk**Answer: c Diff: M**

28. Assume that all interest rates in the economy decline from 10 percent to 9 percent. Which of the following bonds will have the largest percentage increase in price?

- a. A 10-year bond with a 10 percent coupon.
- b. An 8-year bond with a 9 percent coupon.
- c. A 10-year zero coupon bond.
- d. A 1-year bond with a 15 percent coupon.
- e. A 3-year bond with a 10 percent coupon.

Price risk

Answer: c Diff: M

29. Which of the following has the greatest interest rate (price) risk?
- a. A 10-year, \$1,000 face value, 10 percent coupon bond with semiannual interest payments.
 - b. A 10-year, \$1,000 face value, 10 percent coupon bond with annual interest payments.
 - c. A 10-year, \$1,000 face value, zero coupon bond.
 - d. A 10-year \$100 annuity.
 - e. All of the above have the same price risk since they all mature in 10 years.

Price risk

Answer: c Diff: M

30. If the yield to maturity decreased 1 percentage point, which of the following bonds would have the largest percentage increase in value?
- a. A 1-year bond with an 8 percent coupon.
 - b. A 1-year zero coupon bond.
 - c. A 10-year zero coupon bond.
 - d. A 10-year bond with an 8 percent coupon.
 - e. A 10-year bond with a 12 percent coupon.

Price risk

Answer: a Diff: M

31. If interest rates fall from 8 percent to 7 percent, which of the following bonds will have the largest percentage increase in its value?
- a. A 10-year zero coupon bond.
 - b. A 10-year bond with a 10 percent semiannual coupon.
 - c. A 10-year bond with a 10 percent annual coupon.
 - d. A 5-year zero coupon bond.
 - e. A 5-year bond with a 12 percent annual coupon.

Price risk

Answer: a Diff: M

32. Which of the following Treasury bonds will have the largest amount of interest rate risk (price risk)?
- a. A 7 percent coupon bond that matures in 12 years.
 - b. A 9 percent coupon bond that matures in 10 years.
 - c. A 12 percent coupon bond that matures in 7 years.
 - d. A 7 percent coupon bond that matures in 9 years.
 - e. A 10 percent coupon bond that matures in 10 years.

Price risk**Answer: a Diff: M**

33. All treasury securities have a yield to maturity of 7 percent--so the yield curve is flat. If the yield to maturity on all Treasuries were to decline to 6 percent, which of the following bonds would have the largest percentage increase in price?
- a. 15-year zero coupon Treasury bond.
 - b. 12-year Treasury bond with a 10 percent annual coupon.
 - c. 15-year Treasury bond with a 12 percent annual coupon.
 - d. 2-year zero coupon Treasury bond.
 - e. 2-year Treasury bond with a 15 percent annual coupon.

Bond concepts**Answer: e Diff: M**

34. Which of the following statements is most correct?
- a. Other things held constant, a callable bond would have a lower required rate of return than a noncallable bond.
 - b. Other things held constant, a corporation would rather issue noncallable bonds than callable bonds.
 - c. Reinvestment rate risk is worse from a typical investor's standpoint than interest rate risk.
 - d. If a 10-year, \$1,000 par, zero coupon bond were issued at a price that gave investors a 10 percent rate of return, and if interest rates then dropped to the point where $k_d = YTM = 5\%$, we could be sure that the bond would sell at a premium over its \$1,000 par value.
 - e. If a 10-year, \$1,000 par, zero coupon bond were issued at a price that gave investors a 10 percent rate of return, and if interest rates then dropped to the point where $k_d = YTM = 5\%$, we could be sure that the bond would sell at a discount below its \$1,000 par value.

Bond concepts**Answer: d Diff: M**

35. Which of the following statements is most correct?
- a. The market value of a bond will always approach its par value as its maturity date approaches, provided the issuer of the bond does not go bankrupt.
 - b. If the Federal Reserve unexpectedly announces that it expects inflation to increase, then we would probably observe an immediate increase in bond prices.
 - c. The total yield on a bond is derived from interest payments and changes in the price of the bond.
 - d. Statements a and c are correct.
 - e. All of the statements above are correct.

Bond concepts**Answer: b Diff: M**

36. Which of the following statements is most correct?
- a. If a bond is selling for a premium, this implies that the bond's yield to maturity exceeds its coupon rate.
 - b. If a coupon bond is selling at par, its current yield equals its yield to maturity.
 - c. If rates fall after its issue, a zero coupon bond could trade for an amount above its par value.
 - d. Statements b and c are correct.
 - e. None of the statements above is correct.

Bond concepts**Answer: b Diff: M**

37. Which of the following statements is most correct?
- a. All else equal, a bond that has a coupon rate of 10 percent will sell at a discount if the required return for a bond of similar risk is 8 percent.
 - b. The price of a discount bond will increase over time, assuming that the bond's yield to maturity remains constant over time.
 - c. The total return on a bond for a given year consists only of the coupon interest payments received.
 - d. Statements b and c are correct.
 - e. All of the statements above are correct.

Bond concepts**Answer: e Diff: M**

38. Which of the following statements is most correct?
- a. When large firms are in financial distress, they are almost always liquidated.
 - b. Debentures generally have a higher yield to maturity relative to mortgage bonds.
 - c. If there are two bonds with equal maturity and credit risk, the bond that is callable will have a higher yield to maturity than the bond that is noncallable.
 - d. Statements a and c are correct.
 - e. Statements b and c are correct.

Bond concepts**Answer: d Diff: M**

39. A 10-year bond has a 10 percent annual coupon and a yield to maturity of 12 percent. The bond can be called in 5 years at a call price of \$1,050 and the bond's face value is \$1,000. Which of the following statements is most correct?
- a. The bond's current yield is greater than 10 percent.
 - b. The bond's yield to call is less than 12 percent.
 - c. The bond is selling at a price below par.
 - d. Statements a and c are correct.
 - e. None of the statements above is correct.

Bond concepts**Answer: d Diff: M N**

40. Bond X has an 8 percent annual coupon, Bond Y has a 10 percent annual coupon, and Bond Z has a 12 percent annual coupon. Each of the bonds has a maturity of 10 years and a yield to maturity of 10 percent. Which of the following statements is most correct?
- a. Bond X has the greatest reinvestment rate risk.
 - b. If market interest rates remain at 10 percent, Bond Z's price will be 10 percent higher one year from today.
 - c. If market interest rates increase, Bond X's price will increase, Bond Z's price will decline, and Bond Y's price will remain the same.
 - d. If market interest rates remain at 10 percent, Bond Z's price will be lower one year from now than it is today.
 - e. If market interest rates decline, all of the bonds will have an increase in price, and Bond Z will have the largest percentage increase in price.

Bond concepts**Answer: b Diff: M N**

41. Bonds A, B, and C all have a maturity of 10 years and a yield to maturity equal to 7 percent. Bond A's price exceeds its par value, Bond B's price equals its par value, and Bond C's price is less than its par value. Which of the following statements is most correct?
- a. If the yield to maturity on the three bonds remains constant, the price of the three bonds will remain the same over the course of the next year.
 - b. If the yield to maturity on each bond increases to 8 percent, the price of all three bonds will decline.
 - c. If the yield to maturity on each bond decreases to 6 percent, Bond A will have the largest percentage increase in its price.
 - d. Statements a and c are correct.
 - e. All of the above statements are correct.

Interest rates and bond prices**Answer: e Diff: M N**

42. Bond A has a 9 percent annual coupon, while Bond B has a 7 percent annual coupon. Both bonds have the same maturity, a face value of \$1,000, and an 8 percent yield to maturity. Which of the following statements is most correct?
- a. Bond A trades at a discount, whereas Bond B trades at a premium.
 - b. If the yield to maturity for both bonds remains at 8 percent, Bond A's price one year from now will be higher than it is today, but Bond B's price one year from now will be lower than it is today.
 - c. If the yield to maturity for both bonds immediately decreases to 6 percent, Bond A's bond will have a larger percentage increase in value.
 - d. All of the statements above are correct.
 - e. None of the statements above is correct.

Callable bond**Answer: d Diff: M**

43. Which of the following statements is most correct?

- a. Distant cash flows are generally riskier than near-term cash flows. Further, a 20-year bond that is callable after 5 years will have an expected life that is probably shorter, and certainly no longer, than an otherwise similar noncallable 20-year bond. Therefore, investors should require a lower rate of return on the callable bond than on the noncallable bond, assuming other characteristics are similar.
- b. A noncallable 20-year bond will generally have an expected life that is equal to or greater than that of an otherwise identical callable 20-year bond. Moreover, the interest rate risk faced by investors is greater the longer the maturity of a bond. Therefore, callable bonds expose investors to less interest rate risk than noncallable bonds, other things held constant.
- c. Statements a and b are correct.
- d. None of the statements above is correct.

Callable bond**Answer: b Diff: M**

44. Which of the following statements is most correct?

- a. A callable 10-year, 10 percent bond should sell at a higher price than an otherwise similar noncallable bond.
- b. Two bonds have the same maturity and the same coupon rate. However, one is callable and the other is not. The difference in prices between the bonds will be greater if the current market interest rate is below the coupon rate than if it is above the coupon rate.
- c. Two bonds have the same maturity and the same coupon rate. However, one is callable and the other is not. The difference in prices between the bonds will be greater if the current market interest rate is above the coupon rate than if it is below the coupon rate.
- d. The actual life of a callable bond will be equal to or less than the actual life of a noncallable bond with the same maturity date. Therefore, if the yield curve is upward sloping, the required rate of return will be lower on the callable bond.
- e. Corporate treasurers dislike issuing callable bonds because these bonds may require the company to raise additional funds earlier than would be true if noncallable bonds with the same maturity were used.

Types of debt and their relative costs

Answer: c Diff: M

45. A company is planning to raise \$1,000,000 to finance a new plant. Which of the following statements is most correct?
- a. If debt is used to raise the million dollars, the cost of the debt would be lower if the debt is in the form of a fixed rate bond rather than a floating rate bond.
 - b. If debt is used to raise the million dollars, the cost of the debt would be lower if the debt is in the form of a bond rather than a term loan.
 - c. If debt is used to raise the million dollars, but \$500,000 is raised as a first mortgage bond on the new plant and \$500,000 as debentures, the interest rate on the first mortgage bonds would be lower than it would be if the entire \$1 million were raised by selling first mortgage bonds.
 - d. The company would be especially anxious to have a call provision included in the indenture if its management thinks that interest rates are almost certain to rise in the foreseeable future.
 - e. None of the statements above is correct.

Miscellaneous concepts

Answer: c Diff: M

46. Which of the following statements is most correct?
- a. Once a firm declares bankruptcy, it is liquidated by the trustee, who uses the proceeds to pay bondholders, unpaid wages, taxes, and lawyer fees.
 - b. A firm with a sinking fund payment coming due would generally choose to buy back bonds in the open market, if the price of the bond exceeds the sinking fund call price.
 - c. Income bonds pay interest only when the amount of the interest is actually earned by the company. Thus, these securities cannot bankrupt a company and this makes them safer to investors than regular bonds.
 - d. One disadvantage of zero coupon bonds is that issuing firms cannot realize the tax savings from issuing debt until the bonds mature.
 - e. Other things held constant, callable bonds should have a lower yield to maturity than noncallable bonds.

Miscellaneous concepts**Answer: b Diff: M**

47. Which of the following statements is most correct?
- a. A 10-year 10 percent coupon bond has less reinvestment rate risk than a 10-year 5 percent coupon bond (assuming all else equal).
 - b. The total return on a bond for a given year arises from both the coupon interest payments received for the year and the change in the value of the bond from the beginning to the end of the year.
 - c. The price of a 20-year 10 percent bond is less sensitive to changes in interest rates (that is, has lower interest rate risk) than the price of a 5-year 10 percent bond.
 - d. A \$1,000 bond with \$100 annual interest payments with five years to maturity (not expected to default) would sell for a discount if interest rates were below 9 percent and would sell for a premium if interest rates were greater than 11 percent.
 - e. Statements a, b, and c are correct.

Miscellaneous concepts**Answer: e Diff: M**

48. Which of the following statements is most correct?
- a. All else equal, a 1-year bond will have a higher (that is, better) bond rating than a 20-year bond.
 - b. A 20-year bond with semiannual interest payments has higher price risk (that is, interest rate risk) than a 5-year bond with semiannual interest payments.
 - c. 10-year zero coupon bonds have higher reinvestment rate risk than 10-year, 10 percent coupon bonds.
 - d. If a callable bond were trading at a premium, then you would expect to earn the yield to maturity.
 - e. Statements a and b are correct.

Current yield and yield to maturity**Answer: e Diff: M**

49. Which of the following statements is most correct?
- a. If a bond sells for less than par, then its yield to maturity is less than its coupon rate.
 - b. If a bond sells at par, then its current yield will be less than its yield to maturity.
 - c. Assuming that both bonds are held to maturity and are of equal risk, a bond selling for more than par with 10 years to maturity will have a lower current yield and higher capital gain relative to a bond that sells at par.
 - d. Statements a and c are correct.
 - e. None of the statements above is correct.

Current yield and yield to maturity**Answer: a Diff: M**

50. You just purchased a 10-year corporate bond that has an annual coupon of 10 percent. The bond sells at a premium above par. Which of the following statements is most correct?
- a. The bond's yield to maturity is less than 10 percent.
 - b. The bond's current yield is greater than 10 percent.
 - c. If the bond's yield to maturity stays constant, the bond's price will be the same one year from now.
 - d. Statements a and c are correct.
 - e. None of the statements above is correct.

Corporate bonds and default risk**Answer: c Diff: M**

51. Which of the following statements is most correct?
- a. The expected return on corporate bonds will generally exceed the yield to maturity.
 - b. Firms that are in financial distress are forced to declare bankruptcy.
 - c. All else equal, senior debt will generally have a lower yield to maturity than subordinated debt.
 - d. Statements a and c are correct.
 - e. None of the statements above is correct.

Default risk and bankruptcy**Answer: b Diff: M**

52. Which of the following statements is incorrect?
- a. Firms will often voluntarily enter bankruptcy before they are forced into bankruptcy by their creditors.
 - b. An indenture is a bond that is less risky than a subordinated debenture.
 - c. When a firm files for Chapter 11 bankruptcy, it may attempt to restructure its existing debt by changing (subject to creditor approval) the interest payments, maturity, and/or principal amount.
 - d. All else equal, mortgage bonds are less risky than debentures because mortgage bonds provide investors with a lien (that is, a claim) against specific property.
 - e. A company's bond rating is affected by financial performance and provisions in the bond contract.

Default risk and bankruptcy**Answer: b Diff: M**

53. Which of the following statements is most correct?
- a. If a company increases its debt ratio, this is likely to reduce the default premium on its existing bonds.
 - b. All else equal, senior debt has less default risk than subordinated debt.
 - c. When companies enter Chapter 11, their assets are immediately liquidated and the firm no longer continues to operate.
 - d. Statements a and c are correct.
 - e. All of the statements above are correct.

Default risk and bankruptcy**Answer: d Diff: M**

54. Which of the following statements is most correct?
- a. The expected return on a corporate bond is always less than its promised return when the probability of default is greater than zero.
 - b. All else equal, secured debt is considered to be less risky than unsecured debt.
 - c. Under Chapter 11 Bankruptcy, the firm's assets are sold and debts are paid off according to the seniority of the debt claim.
 - d. Statements a and b are correct.
 - e. All of the statements above are correct.

Sinking funds and bankruptcy**Answer: d Diff: M**

55. Which of the following statements is correct?
- a. If a company is retiring bonds for sinking fund purposes it will buy back bonds on the open market when the coupon rate is less than the market interest rate.
 - b. A bond sinking fund would be good for investors if interest rates have declined after issuance and the investor's bonds get called.
 - c. A company that files for Chapter 11 Reorganization under the Federal Bankruptcy Act can temporarily prevent foreclosure and seizing of the assets of the company. Liquidation may still occur for this company.
 - d. Statements a and c are correct.
 - e. All of the statements above are correct.

Tough:**Bond yields and prices****Answer: b Diff: T**

56. Which of the following statements is most correct?
- a. If a bond's yield to maturity exceeds its coupon rate, the bond's current yield must also exceed its coupon rate.
 - b. If a bond's yield to maturity exceeds its coupon rate, the bond's price must be less than its maturity value.
 - c. If two bonds have the same maturity, the same yield to maturity, and the same level of risk, the bonds should sell for the same price regardless of the bond's coupon rate.
 - d. Statements b and c are correct.
 - e. None of the statements above is correct.

Bond concepts**Answer: b Diff: T**

57. Which of the following statements is incorrect about bonds? In all of the statements, assume other things are held constant.
- a. Price sensitivity, that is, the change in price due to a given change in the required rate of return, increases as a bond's maturity increases.
 - b. For a given bond of any maturity, a given percentage point increase in the interest rate (k_d) causes a larger dollar capital loss than the capital gain stemming from an identical decrease in the interest rate.
 - c. For any given maturity, a given percentage point increase in the interest rate causes a smaller dollar capital loss than the capital gain stemming from an identical decrease in the interest rate.
 - d. From a borrower's point of view, interest paid on bonds is tax-deductible.
 - e. A 20-year zero coupon bond has less reinvestment rate risk than a 20-year coupon bond.

Bond concepts**Answer: e Diff: T**

58. Which of the following statements is most correct?
- a. All else equal, an increase in interest rates will have a greater effect on the prices of long-term bonds than it will on the prices of short-term bonds.
 - b. All else equal, an increase in interest rates will have a greater effect on higher-coupon bonds than it will have on lower-coupon bonds.
 - c. An increase in interest rates will have a greater effect on a zero coupon bond with 10 years maturity than it will have on a 9-year bond with a 10 percent annual coupon.
 - d. All of the statements above are correct.
 - e. Statements a and c are correct.

Interest vs. reinvestment rate risk**Answer: c Diff: T**

59. Which of the following statements is most correct?
- a. A 10-year bond would have more interest rate risk than a 5-year bond, but all 10-year bonds have the same interest rate risk.
 - b. A 10-year bond would have more reinvestment rate risk than a 5-year bond, but all 10-year bonds have the same reinvestment rate risk.
 - c. If their maturities were the same, a 5 percent coupon bond would have more interest rate risk than a 10 percent coupon bond.
 - d. If their maturities were the same, a 5 percent coupon bond would have less interest rate risk than a 10 percent coupon bond.
 - e. Zero coupon bonds have more interest rate risk than any other type bond, even perpetuities.

Bond indenture**Answer: d Diff: T**

60. Listed below are some provisions that are often contained in bond indentures:

1. Fixed assets may be used as security.
2. The bond may be subordinated to other classes of debt.
3. The bond may be made convertible.
4. The bond may have a sinking fund.
5. The bond may have a call provision.
6. The bond may have restrictive covenants in its indenture.

Which of the above provisions, each viewed alone, would tend to reduce the yield to maturity investors would otherwise require on a newly issued bond?

- a. 1, 2, 3, 4, 5, 6
- b. 1, 2, 3, 4, 6
- c. 1, 3, 4, 5, 6
- d. 1, 3, 4, 6
- e. 1, 4, 6

Types of debt and their relative costs**Answer: e Diff: T**

61. Suppose a new company decides to raise its initial \$200 million of capital as \$100 million of common equity and \$100 million of long-term debt. By an iron-clad provision in its charter, the company can never borrow any more money. Which of the following statements is most correct?

- a. If the debt were raised by issuing \$50 million of debentures and \$50 million of first mortgage bonds, we could be absolutely certain that the firm's total interest expense would be lower than if the debt were raised by issuing \$100 million of debentures.
- b. If the debt were raised by issuing \$50 million of debentures and \$50 million of first mortgage bonds, we could be absolutely certain that the firm's total interest expense would be lower than if the debt were raised by issuing \$100 million of first mortgage bonds.
- c. The higher the percentage of total debt represented by debentures, the greater the risk of, and hence the interest rate on, the debentures.
- d. The higher the percentage of total debt represented by mortgage bonds, the riskier both types of bonds will be, and, consequently, the higher the firm's total dollar interest charges will be.
- e. In this situation, we cannot tell for sure how, or whether, the firm's total interest expense on the \$100 million of debt would be affected by the mix of debentures versus first mortgage bonds. Interest rates on the two types of bonds would vary as their percentages were changed, but the result might well be such that the firm's total interest charges would not be affected materially by the mix between the two.

Multiple Choice: Problems

Easy:

Annual coupon rate

Answer: d Diff: E N

62. An annual coupon bond with a \$1,000 face value matures in 10 years. The bond currently sells for \$903.7351 and has a 9 percent yield to maturity. What is the bond's annual coupon rate?
- a. 6.7%
 - b. 7.0%
 - c. 7.2%
 - d. 7.5%
 - e. 7.7%

Bond value--annual payment

Answer: d Diff: E

63. A 12-year bond has a 9 percent annual coupon, a yield to maturity of 8 percent, and a face value of \$1,000. What is the price of the bond?
- a. \$1,469
 - b. \$1,000
 - c. \$ 928
 - d. \$1,075
 - e. \$1,957

Bond value--semiannual payment

Answer: e Diff: E

64. You intend to purchase a 10-year, \$1,000 face value bond that pays interest of \$60 every 6 months. If your nominal annual required rate of return is 10 percent with semiannual compounding, how much should you be willing to pay for this bond?
- a. \$ 826.31
 - b. \$1,086.15
 - c. \$ 957.50
 - d. \$1,431.49
 - e. \$1,124.62

Bond value--semiannual payment

Answer: d Diff: E

65. Assume that you wish to purchase a 20-year bond that has a maturity value of \$1,000 and makes semiannual interest payments of \$40. If you require a 10 percent nominal yield to maturity on this investment, what is the maximum price you should be willing to pay for the bond?
- a. \$619
 - b. \$674
 - c. \$761
 - d. \$828
 - e. \$902

Bond value--semiannual payment

Answer: e Diff: E N

66. A bond that matures in 12 years has a 9 percent semiannual coupon (i.e., the bond pays a \$45 coupon every six months) and a face value of \$1,000. The bond has a nominal yield to maturity of 8 percent. What is the price of the bond today?
- a. \$ 927.52
 - b. \$ 928.39
 - c. \$1,073.99
 - d. \$1,075.36
 - e. \$1,076.23

Bond value--semiannual payment

Answer: b Diff: E N

67. A bond with 10 years to maturity has a face value of \$1,000. The bond pays an 8 percent semiannual coupon, and the bond has a 9 percent nominal yield to maturity. What is the price of the bond today?
- a. \$908.71
 - b. \$934.96
 - c. \$935.82
 - d. \$952.37
 - e. \$960.44

Bond value--semiannual payment

Answer: c Diff: E

68. A corporate bond with a \$1,000 face value pays a \$50 coupon every six months. The bond will mature in 10 years, and has a nominal yield to maturity of 9 percent. What is the price of the bond?
- a. \$ 634.86
 - b. \$1,064.18
 - c. \$1,065.04
 - d. \$1,078.23
 - e. \$1,094.56

Bond value--semiannual payment

Answer: b Diff: E

69. A bond with a \$1,000 face value and an 8 percent annual coupon pays interest semiannually. The bond will mature in 15 years. The nominal yield to maturity is 11 percent. What is the price of the bond today?
- a. \$ 784.27
 - b. \$ 781.99
 - c. \$1,259.38
 - d. \$1,000.00
 - e. \$ 739.19

Bond value--semiannual payment**Answer: c Diff: E N**

70. A 12-year bond has an 8 percent semiannual coupon and a face value of \$1,000. The bond pays a \$40 coupon every six months. The bond has a nominal yield to maturity of 7 percent. What is the price of the bond?
- a. \$1,114.69
 - b. \$ 761.72
 - c. \$1,080.29
 - d. \$ 655.92
 - e. \$1,079.43

Bond value--quarterly payment**Answer: c Diff: E**

71. A \$1,000 par value bond pays interest of \$35 each quarter and will mature in 10 years. If your nominal annual required rate of return is 12 percent with quarterly compounding, how much should you be willing to pay for this bond?
- a. \$ 941.36
 - b. \$1,051.25
 - c. \$1,115.57
 - d. \$1,391.00
 - e. \$ 825.49

Yield to maturity--annual bond**Answer: a Diff: E**

72. Palmer Products has outstanding bonds with an annual 8 percent coupon. The bonds have a par value of \$1,000 and a price of \$865. The bonds will mature in 11 years. What is the yield to maturity on the bonds?
- a. 10.09%
 - b. 11.13%
 - c. 9.25%
 - d. 8.00%
 - e. 9.89%

Yield to maturity--semiannual bond**Answer: c Diff: E**

73. A corporate bond has a face value of \$1,000, and pays a \$50 coupon every six months (that is, the bond has a 10 percent semiannual coupon). The bond matures in 12 years and sells at a price of \$1,080. What is the bond's nominal yield to maturity?
- a. 8.28%
 - b. 8.65%
 - c. 8.90%
 - d. 9.31%
 - e. 10.78%

Yield to maturity--semiannual bond**Answer: b Diff: E**

74. You just purchased a \$1,000 par value, 9-year, 7 percent annual coupon bond that pays interest on a semiannual basis. The bond sells for \$920. What is the bond's nominal yield to maturity?
- a. 7.28%
 - b. 8.28%
 - c. 9.60%
 - d. 8.67%
 - e. 4.13%

YTM and YTC--semiannual bond**Answer: e Diff: E**

75. A corporate bond matures in 14 years. The bond has an 8 percent semiannual coupon and a par value of \$1,000. The bond is callable in five years at a call price of \$1,050. The price of the bond today is \$1,075. What are the bond's yield to maturity and yield to call?
- a. YTM = 14.29%; YTC = 14.09%
 - b. YTM = 3.57%; YTC = 3.52%
 - c. YTM = 7.14%; YTC = 7.34%
 - d. YTM = 6.64%; YTC = 4.78%
 - e. YTM = 7.14%; YTC = 7.05%

Yield to maturity and bond value--annual bond**Answer: d Diff: E**

76. A 20-year bond with a par value of \$1,000 has a 9 percent annual coupon. The bond currently sells for \$925. If the bond's yield to maturity remains at its current rate, what will be the price of the bond 5 years from now?
- a. \$ 966.79
 - b. \$ 831.35
 - c. \$1,090.00
 - d. \$ 933.09
 - e. \$ 925.00

Current yield**Answer: b Diff: E**

77. Consider a \$1,000 par value bond with a 7 percent annual coupon. The bond pays interest annually. There are 9 years remaining until maturity. What is the current yield on the bond assuming that the required return on the bond is 10 percent?
- a. 10.00%
 - b. 8.46%
 - c. 7.00%
 - d. 8.52%
 - e. 8.37%

Current yield**Answer: d Diff: E**

78. A 12-year bond pays an annual coupon of 8.5 percent. The bond has a yield to maturity of 9.5 percent and a par value of \$1,000. What is the bond's current yield?
- a. 6.36%
 - b. 2.15%
 - c. 8.95%
 - d. 9.14%
 - e. 10.21%

Current yield**Answer: c Diff: E**

79. A 15-year bond with an 8 percent annual coupon has a face value of \$1,000. The bond's yield to maturity is 7 percent. What is the bond's current yield?
- a. 3.33%
 - b. 5.00%
 - c. 7.33%
 - d. 7.50%
 - e. 8.00%

Current yield and yield to maturity**Answer: b Diff: E**

80. A bond matures in 12 years and pays an 8 percent annual coupon. The bond has a face value of \$1,000 and currently sells for \$985. What is the bond's current yield and yield to maturity?
- a. Current yield = 8.00%; yield to maturity = 7.92%
 - b. Current yield = 8.12%; yield to maturity = 8.20%
 - c. Current yield = 8.20%; yield to maturity = 8.37%
 - d. Current yield = 8.12%; yield to maturity = 8.37%
 - e. Current yield = 8.12%; yield to maturity = 7.92%

Future bond value--annual payment**Answer: b Diff: E N**

81. A bond with a face value of \$1,000 matures in 10 years. The bond has an 8 percent annual coupon and a yield to maturity of 10 percent. If market interest rates remain at 10 percent, what will be the price of the bond two years from today?
- a. \$ 877.11
 - b. \$ 893.30
 - c. \$1,061.30
 - d. \$ 912.55
 - e. \$1,023.06

Risk premium on bonds**Answer: c Diff: E**

82. Rollincoast Incorporated issued BBB bonds two years ago that provided a yield to maturity of 11.5 percent. Long-term risk-free government bonds were yielding 8.7 percent at that time. The current risk premium on BBB bonds versus government bonds is half of what it was two years ago. If the risk-free long-term government bonds are currently yielding 7.8 percent, then at what rate should Rollincoast expect to issue new bonds?
- a. 7.8%
 - b. 8.7%
 - c. 9.2%
 - d. 10.2%
 - e. 12.9%

Medium:**Bond value--annual payment****Answer: e Diff: M**

83. A 6-year bond that pays 8 percent interest semiannually sells at par (\$1,000). Another 6-year bond of equal risk pays 8 percent interest annually. Both bonds are noncallable and have face values of \$1,000. What is the price of the bond that pays annual interest?
- a. \$689.08
 - b. \$712.05
 - c. \$980.43
 - d. \$986.72
 - e. \$992.64

Bond value--annual payment**Answer: a Diff: M**

84. A 10-year bond with a 9 percent semiannual coupon is currently selling at par. A 10-year bond with a 9 percent annual coupon has the same risk, and therefore, the same effective annual return as the semiannual bond. If the annual coupon bond has a face value of \$1,000, what will be its price?
- a. \$ 987.12
 - b. \$1,000.00
 - c. \$ 471.87
 - d. \$1,089.84
 - e. \$ 967.34

Bond value--annual payment**Answer: d Diff: M**

85. You are the owner of 100 bonds issued by Euler, Ltd. These bonds have 8 years remaining to maturity, an annual coupon payment of \$80, and a par value of \$1,000. Unfortunately, Euler is on the brink of bankruptcy. The creditors, including yourself, have agreed to a postponement of the next 4 interest payments (otherwise, the next interest payment would have been due in 1 year). The remaining interest payments, for Years 5 through 8, will be made as scheduled. The postponed payments will accrue interest at an annual rate of 6 percent, and they will then be paid as a lump sum at maturity 8 years hence. The required rate of return on these bonds, considering their substantial risk, is now 28 percent. What is the present value of each bond?
- a. \$538.21
 - b. \$426.73
 - c. \$384.84
 - d. \$266.88
 - e. \$249.98

Bond value--annual payment**Answer: a Diff: M**

86. Marie Snell recently inherited some bonds (face value \$100,000) from her father, and soon thereafter she became engaged to Sam Spade, a University of Florida marketing graduate. Sam wants Marie to cash in the bonds so the two of them can use the money to "live like royalty" for two years in Monte Carlo. The 2 percent annual coupon bonds mature on December 31, 2022, and it is now January 1, 2003. Interest on these bonds is paid annually on December 31 of each year, and new annual coupon bonds with similar risk and maturity are currently yielding 12 percent. If Marie sells her bonds now and puts the proceeds into an account that pays 10 percent compounded annually, what would be the largest equal annual amounts she could withdraw for two years, beginning today (that is, two payments, the first payment today and the second payment one year from today)?
- a. \$13,255
 - b. \$29,708
 - c. \$12,654
 - d. \$25,305
 - e. \$14,580

Bond value--semiannual payment**Answer: d Diff: M**

87. Due to a number of lawsuits related to toxic wastes, a major chemical manufacturer has recently experienced a market reevaluation. The firm has a bond issue outstanding with 15 years to maturity and a coupon rate of 8 percent, with interest paid semiannually. The required nominal rate on this debt has now risen to 16 percent. What is the current value of this bond?
- a. \$1,273
 - b. \$1,000
 - c. \$7,783
 - d. \$ 550
 - e. \$ 450

Bond value--semiannual payment**Answer: b Diff: M**

88. JRJ Corporation recently issued 10-year bonds at a price of \$1,000. These bonds pay \$60 in interest each six months. Their price has remained stable since they were issued, that is, they still sell for \$1,000. Due to additional financing needs, the firm wishes to issue new bonds that would have a maturity of 10 years, a par value of \$1,000, and pay \$40 in interest every six months. If both bonds have the same yield, how many new bonds must JRJ issue to raise \$2,000,000?
- a. 2,400
 - b. 2,596
 - c. 3,000
 - d. 5,000
 - e. 4,275

Bond value--semiannual payment**Answer: d Diff: M**

89. Assume that you are considering the purchase of a \$1,000 par value bond that pays interest of \$70 each six months and has 10 years to go before it matures. If you buy this bond, you expect to hold it for 5 years and then to sell it in the market. You (and other investors) currently require a nominal annual rate of 16 percent, but you expect the market to require a nominal rate of only 12 percent when you sell the bond due to a general decline in interest rates. How much should you be willing to pay for this bond?
- a. \$ 842.00
 - b. \$1,115.81
 - c. \$1,359.26
 - d. \$ 966.99
 - e. \$ 731.85

Bond value--semiannual payment**Answer: d Diff: M**

90. An 8 percent annual coupon, noncallable bond has 10 years until it matures and a yield to maturity of 9.1 percent. What should be the price of a 10-year noncallable bond of equal risk that pays an 8 percent semiannual coupon? Assume both bonds have a par value of \$1,000.
- a. \$ 898.64
 - b. \$ 736.86
 - c. \$ 854.27
 - d. \$ 941.09
 - e. \$ 964.23

Bond value--semiannual payment**Answer: a Diff: M N**

91. A bond with 12 years to maturity has a 7 percent semiannual coupon and a face value of \$1,000. (That is, the bond pays a \$35 coupon every six months.) The bond currently sells for \$1,000. What should be the price of a bond with the same risk and maturity that pays a 7 percent annual coupon and has a face value of \$1,000?
- a. \$ 990.33
 - b. \$ 996.50
 - c. \$1,000.00
 - d. \$1,002.29
 - e. \$1,012.82

Bond value--quarterly payment**Answer: b Diff: M**

92. Assume that a 15-year, \$1,000 face value bond pays interest of \$37.50 every 3 months. If you require a nominal annual rate of return of 12 percent, with quarterly compounding, how much should you be willing to pay for this bond? (Hint: The PVIFA and PVIF for 3 percent, 60 periods are 27.6756 and 0.1697, respectively.)
- a. \$ 821.92
 - b. \$1,207.57
 - c. \$ 986.43
 - d. \$1,120.71
 - e. \$1,358.24

Bond value--quarterly payment**Answer: b Diff: M**

93. Your client has been offered a 5-year, \$1,000 par value bond with a 10 percent coupon. Interest on this bond is paid quarterly. If your client is to earn a nominal rate of return of 12 percent, compounded quarterly, how much should she pay for the bond?
- a. \$ 800
 - b. \$ 926
 - c. \$1,025
 - d. \$1,216
 - e. \$ 981

Call price--quarterly payment**Answer: c Diff: M**

94. Kennedy Gas Works has bonds that mature in 10 years, and have a face value of \$1,000. The bonds have a 10 percent quarterly coupon (that is, the nominal coupon rate is 10 percent). The bonds may be called in five years. The bonds have a nominal yield to maturity of 8 percent and a yield to call of 7.5 percent. What is the bonds' call price?
- a. \$ 379.27
 - b. \$1,025.00
 - c. \$1,048.34
 - d. \$1,036.77
 - e. \$1,136.78

Call price--semiannual payment**Answer: e Diff: M**

95. A 15-year bond with a 10 percent semiannual coupon and a \$1,000 face value has a nominal yield to maturity of 7.5 percent. The bond, which may be called after five years, has a nominal yield to call of 5.54 percent. What is the bond's call price?
- a. \$ 564
 - b. \$1,110
 - c. \$1,100
 - d. \$1,173
 - e. \$1,040

Yield to call**Answer: a Diff: M N**

96. A bond with a face value of \$1,000 matures in 12 years and has a 9 percent semiannual coupon. (That is, the bond pays a \$45 coupon every six months.) The bond has a nominal yield to maturity of 7.5 percent, and it can be called in 4 years at a call price of \$1,045. What is the bond's nominal yield to call?
- a. 6.61%
 - b. 11.36%
 - c. 3.31%
 - d. 9.98%
 - e. 5.68%

Yield to call--annual bond**Answer: a Diff: M**

97. A corporate bond that matures in 12 years pays a 9 percent annual coupon, has a face value of \$1,000, and a yield to maturity of 7.5 percent. The bond can first be called four years from now. The call price is \$1,050. What is the bond's yield to call?
- a. 6.73%
 - b. 7.10%
 - c. 7.50%
 - d. 11.86%
 - e. 13.45%

Yield to call--annual bond**Answer: b Diff: M**

98. A bond that matures in 11 years has an annual coupon rate of 8 percent with interest paid annually. The bond's face value is \$1,000, and its yield to maturity is 7.5 percent. The bond can be called 3 years from now at a price of \$1,060. What is the bond's nominal yield to call?
- a. 9.82%
 - b. 8.41%
 - c. 8.54%
 - d. 8.38%
 - e. 7.86%

Yield to call--semiannual bond**Answer: a Diff: M**

99. A corporate bond with 12 years to maturity has a 9 percent semiannual coupon and a face value of \$1,000. (That is, the semiannual coupon payments are \$45.) The bond has a nominal yield to maturity of 7 percent. The bond can be called in three years at a call price of \$1,045. What is the bond's nominal yield to call?
- a. 4.62%
 - b. 10.32%
 - c. 17.22%
 - d. 5.16%
 - e. 2.31%

Yield to call--semiannual bond**Answer: b Diff: M**

100. Hood Corporation recently issued 20-year bonds. The bonds have a coupon rate of 8 percent and pay interest semiannually. Also, the bonds are callable in 6 years at a call price equal to 115 percent of par value. The par value of the bonds is \$1,000. If the yield to maturity is 7 percent, what is the yield to call?
- a. 8.33%
 - b. 7.75%
 - c. 9.89%
 - d. 10.00%
 - e. 7.00%

Yield to call--semiannual bond**Answer: d Diff: M**

101. A 12-year bond with a 10 percent semiannual coupon and a \$1,000 par value has a nominal yield to maturity of 9 percent. The bond can be called in five years at a call price of \$1,050. What is the bond's nominal yield to call?
- a. 4.50%
 - b. 8.25%
 - c. 8.88%
 - d. 8.98%
 - e. 9.00%

Yield to call--semiannual bond

Answer: c Diff: M

102. A corporate bond with an 11 percent semiannual coupon has a yield to maturity of 9 percent. The bond matures in 20 years but is callable in 10 years. The maturity value is \$1,000. The call price is \$1,055. What is the bond's yield to call?

- a. 8.43%
- b. 8.50%
- c. 8.58%
- d. 8.65%
- e. 9.00%

Yield to call--semiannual bond

Answer: b Diff: M

103. McGriff Motors has bonds outstanding that will mature in 12 years. The bonds pay a 12 percent semiannual coupon and have a face value of \$1,000 (that is, the bonds pay a \$60 coupon every six months). The bonds currently have a yield to maturity of 10 percent. The bonds are callable in 8 years and have a call price of \$1,050. What is the bonds' yield to call?

- a. 8.89%
- b. 9.89%
- c. 9.94%
- d. 10.00%
- e. 12.00%

Yield to call--semiannual bond

Answer: c Diff: M

104. A 12-year bond has a 10 percent semiannual coupon and a face value of \$1,000. The bond has a nominal yield to maturity of 7 percent. The bond can be called in five years at a call price of \$1,050. What is the bond's nominal yield to call?

- a. 5.29%
- b. 5.40%
- c. 5.33%
- d. 5.76%
- e. 4.56%

Yield to call--semiannual bond

Answer: c Diff: M

105. A 12-year, \$1,000 face value bond has an 8 percent semiannual coupon and a nominal yield to maturity of 6 percent. The bond is callable in 5 years at a call price of \$1,040. What is the bond's nominal yield to call?

- a. 1.76%
- b. 8.27%
- c. 4.86%
- d. 3.52%
- e. 5.22%

Yield to call--semiannual bond

Answer: b Diff: M N

106. A 10-year bond sells for \$1,075. The bond has a 9 percent semiannual coupon and a face value of \$1,000. (That is, the bond pays a \$45 coupon every six months.) The bond is callable in 5 years and the call price is \$1,035. What is the bond's nominal yield to call?
- a. 7.19%
 - b. 7.75%
 - c. 7.90%
 - d. 8.00%
 - e. 8.13%

Yield to maturity

Answer: c Diff: M N

107. A bond with a face value of \$1,000 has a 10-year maturity and an 8.5 percent annual coupon. The bond has a current yield of 8 percent. What is the bond's yield to maturity?
- a. 8.25%
 - b. 8.86%
 - c. 7.59%
 - d. 8.50%
 - e. 8.00%

Yield to maturity--semiannual bond

Answer: d Diff: M

108. A 15-year bond with a 10 percent semiannual coupon has a par value of \$1,000. The bond may be called after 10 years at a call price of \$1,050. The bond has a nominal yield to call of 6.5 percent. What is the bond's yield to maturity, stated on a nominal, or annual basis?
- a. 5.97%
 - b. 6.30%
 - c. 6.75%
 - d. 6.95%
 - e. 7.10%

Yield to maturity--semiannual bond

Answer: d Diff: M

109. A 10-year bond has a face value of \$1,000. The bond has a 7 percent semiannual coupon. The bond is callable in 7 years at a call price of \$1,040. The bond has a nominal yield to call of 6.5 percent. What is the bond's nominal yield to maturity?
- a. 3.14%
 - b. 6.05%
 - c. 7.62%
 - d. 6.27%
 - e. 6.55%

Yield to maturity--semiannual bond**Answer: d Diff: M N**

110. A bond that matures in 8 years has a 9.5 percent coupon rate, semiannual payments, a face value of \$1,000, and an 8.2 percent current yield. What is the bond's nominal yield to maturity (YTM)?

- a. 7.20%
- b. 7.45%
- c. 6.55%
- d. 6.89%
- e. 8.20%

Annual interest payments remaining**Answer: b Diff: M**

111. You have just been offered a \$1,000 par value bond for \$847.88. The coupon rate is 8 percent, payable annually, and annual interest rates on new issues of the same degree of risk are 10 percent. You want to know how many more interest payments you will receive, but the party selling the bond cannot remember. Can you determine how many interest payments remain?

- a. 14
- b. 15
- c. 12
- d. 20
- e. 10

Current yield and capital gains yield**Answer: c Diff: M**

112. Meade Corporation bonds mature in 6 years and have a yield to maturity of 8.5 percent. The par value of the bonds is \$1,000. The bonds have a 10 percent coupon rate and pay interest on a semiannual basis. What are the current yield and capital gains yield on the bonds for this year? (Assume that interest rates do not change over the course of the year.)

- a. Current yield = 8.50%; capital gains yield = 1.50%
- b. Current yield = 9.35%; capital gains yield = 0.65%
- c. Current yield = 9.35%; capital gains yield = -0.85%
- d. Current yield = 10.00%; capital gains yield = 0.00%
- e. Current yield = 10.50%; capital gains yield = -1.50%

Current yield and YTM**Answer: c Diff: M**

113. A 16-year bond with a 10 percent annual coupon has a current yield of 8 percent. What is the bond's yield to maturity (YTM)?

- a. 6.9%
- b. 7.1%
- c. 7.3%
- d. 7.5%
- e. 7.7%

Length of time until annual bonds called**Answer: b Diff: M N**

114. Matteo Toys has bonds outstanding that have a 9 percent annual coupon and a face value of \$1,000. The bonds will mature in 10 years, although they can be called before maturity at a call price of \$1,050. The bonds have a yield to call of 6.5 percent and a yield to maturity of 7.4 percent. How long until these bonds may first be called?
- a. 2.21 years
 - b. 3.16 years
 - c. 3.68 years
 - d. 5.37 years
 - e. 6.32 years

Market value of semiannual bonds**Answer: a Diff: M**

115. In order to accurately assess the capital structure of a firm, it is necessary to convert its balance sheet figures to a market value basis. KJM Corporation's balance sheet as of today, January 1, 2003, is as follows:

Long-term debt (bonds, at par)	\$10,000,000
Preferred stock	2,000,000
Common stock (\$10 par)	10,000,000
Retained earnings	<u>4,000,000</u>
Total debt and equity	<u>\$26,000,000</u>

The bonds have a 4 percent coupon rate, payable semiannually, and a par value of \$1,000. They mature on January 1, 2013. The yield to maturity is 12 percent, so the bonds now sell below par. What is the current market value of the firm's debt?

- a. \$5,412,000
- b. \$5,480,000
- c. \$2,531,000
- d. \$7,706,000
- e. \$7,056,000

Future bond value--annual payment**Answer: c Diff: M**

116. You just purchased a 15-year bond with an 11 percent annual coupon. The bond has a face value of \$1,000 and a current yield of 10 percent. Assuming that the yield to maturity of 9.7072 percent remains constant, what will be the price of the bond one year from now?
- a. \$1,000
 - b. \$1,064
 - c. \$1,097
 - d. \$1,100
 - e. \$1,150

Bond coupon rate**Answer: c Diff: M**

117. Cold Boxes Ltd. has 100 bonds outstanding (maturity value = \$1,000). The nominal required rate of return on these bonds is currently 10 percent, and interest is paid semiannually. The bonds mature in 5 years, and their current market value is \$768 per bond. What is the annual coupon interest rate?
- a. 8%
 - b. 6%
 - c. 4%
 - d. 2%
 - e. 0%

Bond coupon rate**Answer: d Diff: M**

118. The current price of a 10-year, \$1,000 par value bond is \$1,158.91. Interest on this bond is paid every six months, and the nominal annual yield is 14 percent. Given these facts, what is the annual coupon rate on this bond?
- a. 10%
 - b. 12%
 - c. 14%
 - d. 17%
 - e. 21%

Tough:**Bond value****Answer: d Diff: T**

119. Assume that McDonald's and Burger King have similar \$1,000 par value bond issues outstanding. The bonds are equally risky. The Burger King bond has an annual coupon rate of 8 percent and matures 20 years from today. The McDonald's bond has a coupon rate of 8 percent, with interest paid semiannually, and it also matures in 20 years. If the nominal required rate of return, k_d , is 12 percent, semiannual basis, for both bonds, what is the difference in current market prices of the two bonds?
- a. \$ 0.50
 - b. \$ 2.20
 - c. \$ 3.77
 - d. \$17.53
 - e. \$ 6.28

Bond value and effective annual rate**Answer: b Diff: T**

120. You are considering investing in a security that matures in 10 years with a par value of \$1,000. During the first five years, the security has an 8 percent coupon with quarterly payments (that is, you receive \$20 a quarter for the first 20 quarters). During the remaining five years the security has a 10 percent coupon with quarterly payments (that is, you receive \$25 a quarter for the second 20 quarters). After 10 years (40 quarters) you receive the par value.

Another 10-year bond has an 8 percent semiannual coupon (that is, the coupon payment is \$40 every six months). This bond is selling at its par value, \$1,000. This bond has the same risk as the security you are thinking of purchasing. Given this information, what should be the price of the security you are considering purchasing?

- a. \$ 898.65
- b. \$1,060.72
- c. \$1,037.61
- d. \$ 943.22
- e. \$1,145.89

Bond value after reorganization**Answer: d Diff: T**

121. Recently, Ohio Hospitals Inc. filed for bankruptcy. The firm was reorganized as American Hospitals Inc., and the court permitted a new indenture on an outstanding bond issue to be put into effect. The issue has 10 years to maturity and a coupon rate of 10 percent, paid annually. The new agreement allows the firm to pay no interest for 5 years. Then, interest payments will be resumed for the next 5 years. Finally, at maturity (Year 10), the principal plus the interest that was not paid during the first 5 years will be paid. However, no interest will be paid on the deferred interest. If the required annual return is 20 percent, what should the bonds sell for in the market today?

- a. \$242.26
- b. \$281.69
- c. \$578.31
- d. \$362.44
- e. \$813.69

Bond sinking fund payment**Answer: d Diff: T**

122. GP&L sold \$1,000,000 of 12 percent, 30-year, semiannual payment bonds 15 years ago. The bonds are not callable, but they do have a sinking fund that requires GP&L to redeem 5 percent of the original face value of the issue each year (\$50,000), beginning in Year 11. To date, 25 percent of the issue has been retired. The company can either call bonds at par for sinking fund purposes or purchase bonds on the open market, spending sufficient money to redeem 5 percent of the original face value each year. If the nominal yield to maturity (15 years remaining) on the bonds is currently 14 percent, what is the least amount of money GP&L must put up to satisfy the sinking fund provision?

- a. \$43,856
- b. \$50,000
- c. \$37,500
- d. \$43,796
- e. \$39,422

Bond coupon payment**Answer: b Diff: T**

123. Fish & Chips Inc. has two bond issues outstanding, and both sell for \$701.22. The first issue has an annual coupon rate of 8 percent and 20 years to maturity. The second has an identical yield to maturity as the first bond, but only 5 years remain until maturity. Both issues pay interest annually. What is the annual interest payment on the second issue?

- a. \$120.00
- b. \$ 37.12
- c. \$ 56.42
- d. \$ 29.68
- e. \$ 11.16

Bonds with differential payments**Answer: c Diff: T**

124. Semiannual payment bonds with the same risk (Aaa) and maturity (20 years) as your company's bonds have a nominal (not EAR) yield to maturity of 9 percent. Your company's treasurer is thinking of issuing at par some \$1,000 par value, 20-year, quarterly payment bonds. She has asked you to determine what quarterly interest payment, in dollars, the company would have to set in order to provide the same effective annual rate (EAR) as those on the 20-year, semiannual payment bonds. What would the quarterly, dollar interest payment be?

- a. \$45.00
- b. \$25.00
- c. \$22.25
- d. \$27.50
- e. \$23.00

Multiple Part:

(The following information applies to the next three problems.)

A bond that matures in 10 years sells for \$925. The bond has a face value of \$1,000 and an 8 percent annual coupon.

Current yield--annual bond

Answer: a Diff: E N

125. What is the bond's current yield?

- a. 8.65%
- b. 8.00%
- c. 8.33%
- d. 7.88%
- e. 8.95%

Yield to maturity--annual bond

Answer: c Diff: M N

126. What is the bond's yield to maturity?

- a. 9.00%
- b. 9.55%
- c. 9.18%
- d. 8.75%
- e. 9.33%

Future bond value--annual payment

Answer: e Diff: M N

127. Assume that the yield to maturity remains constant for the next three years. What will be the price of the bond three years from today?

- a. \$ 925
- b. \$ 956
- c. \$1,000
- d. \$ 977
- e. \$ 941

(The following information applies to the next two problems.)

A 12-year bond has an 8 percent annual coupon and a face value of \$1,000. The bond has a yield to maturity of 7 percent.

Bond value--annual payment

Answer: d Diff: E N

128. What is the price of the annual coupon bond today?

- a. \$ 924.64
- b. \$1,000.00
- c. \$1,070.24
- d. \$1,079.43
- e. \$1,099.21

Future bond value--annual payment

Answer: e Diff: E N

129. If the yield to maturity remains at 7 percent, what will be the price of the bond three years from today?

- a. \$ 937.53
- b. \$ 963.94
- c. \$1,026.24
- d. \$1,052.68
- e. \$1,065.15

(The following information applies to the next two problems.)

A 15-year bond has a par value of \$1,000 and a 10 percent semiannual coupon. (That is, the bond pays a coupon of \$50 every six months.) The bond has a price of \$1,190 and it is callable in 5 years at a call price of \$1,050.

Yield to maturity--semiannual bond

Answer: d Diff: E N

130. What is the semiannual coupon bond's nominal yield to maturity (YTM)?

- a. 6.37%
- b. 6.73%
- c. 7.60%
- d. 7.83%
- e. 8.25%

Yield to call--semiannual bond

Answer: a Diff: E N

131. What is the semiannual coupon bond's nominal yield to call (YTC)?

- a. 6.37%
- b. 6.73%
- c. 7.60%
- d. 7.83%
- e. 8.25%

(The following information applies to the next two problems.)

Hastings Motors has bonds outstanding with 12 years left until maturity. The bonds have a \$1,000 par value and an 8 percent annual coupon. Currently, the bonds sell at a price of \$1,025.

Yield to maturity--annual bond

Answer: a Diff: E N

132. What is the annual coupon bond's yield to maturity?

- a. 7.67%
- b. 7.80%
- c. 8.00%
- d. 8.13%
- e. 8.33%

Price risk--annual bond

Answer: e Diff: M N

133. What will be the percentage increase in the annual coupon bond's price if the yield to maturity were to immediately fall by one percentage point (100 basis points)?
- a. 5.7%
 - b. 6.0%
 - c. 6.9%
 - d. 7.7%
 - e. 8.0%

Web Appendix 7A

Multiple Choice: Conceptual

Easy:

Zero coupon bond concepts

Answer: a Diff: E

- 7A-1. Which of the following statements is most correct?
- a. If interest rates increase, a 10-year zero coupon bond will drop in price by a greater percentage than will a 10-year 8 percent coupon bond.
 - b. One nice thing about zero coupon bonds is that individual investors do not have to pay any taxes on a zero coupon bond until it matures, even if they are not holding the bonds as part of a tax-deferred account.
 - c. If a bond with a sinking fund provision has a yield to maturity greater than its coupon rate, the issuing company would prefer to comply with the sinking fund by calling the bonds in at par rather than buying the bonds back in the open market.
 - d. Statements a and c are correct.
 - e. All of the statements above are correct.

Medium:

Coupon and zero coupon bond concepts

Answer: d Diff: M

- 7A-2. Consider each of the following bonds:

Bond A: 8-year maturity with a 7 percent annual coupon.
Bond B: 10-year maturity with a 9 percent annual coupon.
Bond C: 12-year maturity with a zero coupon.

Each bond has a face value of \$1,000 and a yield to maturity of 8 percent. Which of the following statements is most correct?

- a. Bond A sells at a discount, while Bond B sells at a premium.
- b. If the yield to maturity on each bond falls to 7 percent, Bond C will have the largest percentage increase in its price.
- c. Bond C has the most reinvestment rate risk.
- d. Statements a and b are correct.
- e. All of the statements above are correct.

Multiple Choice: Problems

Easy:

Stripped U.S. Treasury bond

Answer: e Diff: E

7A-3. McGwire Company's pension fund projected that a significant number of its employees would take advantage of an early retirement program the company plans to offer in five years. Anticipating the need to fund these pensions, the firm bought zero coupon U.S. Treasury Trust Certificates maturing in five years. When these instruments were originally issued, they were 12 percent coupon, 30-year U.S. Treasury bonds. The stripped Treasuries are currently priced to yield 10 percent. Their total maturity value is \$6,000,000. What is their total cost (price) to McGwire today?

- a. \$ 553,776
- b. \$5,142,600
- c. \$3,404,561
- d. \$4,042,040
- e. \$3,725,528

Zero coupon bond

Answer: b Diff: E

7A-4. At the beginning of the year, you purchased a 7-year, zero coupon bond with a yield to maturity of 6.8 percent. The bond has a face value of \$1,000. Your tax rate is 30 percent. What is the total tax that you will have to pay on the bond during the first year?

- a. \$20.40
- b. \$12.87
- c. \$30.03
- d. \$13.75
- e. \$11.45

Medium:

Zero coupon bond

Answer: d Diff: M

7A-5. You just purchased a zero coupon bond with a yield to maturity of 9 percent. The bond matures in 12 years, and has a face value of \$1,000. Assume that your tax rate is 25 percent. What is the dollar amount of taxes you will pay at the end of the first year of holding the bond?

- a. \$5.00
- b. \$6.00
- c. \$7.00
- d. \$8.00
- e. \$9.00

Zero coupon bond**Answer: b Diff: M**

- 7A-6. S. Claus & Company is planning a zero coupon bond issue. The bond has a par value of \$1,000, matures in 2 years, and will be sold at a price of \$826.45. The firm's marginal tax rate is 40 percent. What is the annual after-tax cost of debt to the company on this issue?
- a. 4.0%
 - b. 6.0%
 - c. 8.0%
 - d. 10.0%
 - e. 12.0%

Zero coupon bond**Answer: a Diff: M**

- 7A-7. A 15-year zero coupon bond has a yield to maturity of 8 percent and a maturity value of \$1,000. What is the amount of tax an investor in the 30 percent tax bracket will pay the first year of the bond?
- a. \$ 7.57
 - b. \$10.41
 - c. \$15.89
 - d. \$20.44
 - e. \$25.22

Zero coupon bond**Answer: d Diff: M**

- 7A-8. On January 1st Julie bought a 7-year, zero coupon bond with a face value of \$1,000 and a yield to maturity of 6 percent. Assume that Julie's tax rate is 25 percent. How much tax will Julie have to pay on the bond the first year she owns it?
- a. \$15.00
 - b. \$25.00
 - c. \$73.76
 - d. \$ 9.98
 - e. \$83.74

Zero coupon bond and EAR**Answer: d Diff: M**

- 7A-9. U.S. Delay Corporation, a subsidiary of the Postal Service, must decide whether to issue zero coupon bonds or quarterly payment bonds to fund construction of new facilities. The \$1,000 par value quarterly payment bonds would sell at \$795.54, have a 10 percent annual coupon rate, and mature in 10 years. At what price would the zero coupon bonds with a maturity of 10 years have to sell to earn the same effective annual rate as the quarterly payment bonds?
- a. \$274.50
 - b. \$271.99
 - c. \$198.89
 - d. \$257.52
 - e. \$254.84

Callable zero coupon bond**Answer: c Diff: M**

7A-10. Recycler Battery Corporation (RBC) issued zero coupon bonds 5 years ago at a price of \$214.50 per bond. RBC's zeros had a 20-year original maturity, with a \$1,000 par value. The bonds were callable 10 years after the issue date at a price 7 percent over their accrued value on the call date. If the bonds sell for \$239.39 in the market today, what annual rate of return should an investor who buys the bonds today expect to earn on them?

- a. 15.7%
- b. 12.4%
- c. 10.0%
- d. 9.5%
- e. 8.0%

Taxes on zero coupon bond**Answer: a Diff: M**

7A-11. Today is January 1, 2003 and you just purchased a 7-year, zero coupon bond with a face value of \$1,000 and a yield to maturity of 6 percent. Your tax rate is 30 percent. How much in taxes will you have to pay on the bond the first year that you hold it?

- a. \$ 11.97
- b. \$211.49
- c. \$ 12.69
- d. \$ 39.90
- e. \$199.52

Taxes on zero coupon bond**Answer: e Diff: M N**

7A-12. A zero coupon bond with a face value of \$1,000 matures in 15 years. The bond has a yield to maturity of 7 percent. If an investor buys the bond at the beginning of the year, how much money in taxes will the investor have to pay on the zero coupon bond the first year. Assume that the investor has a 25 percent marginal tax rate.

- a. \$5.25
- b. \$5.44
- c. \$5.99
- d. \$6.25
- e. \$6.34

Accrued value and interest expense**Answer: a Diff: M**

7A-13. Vogril Company issued 20-year, zero coupon bonds with an expected yield to maturity of 9 percent. The bonds have a par value of \$1,000 and were sold for \$178.43 each. What is the expected interest expense on these bonds for Year 8?

- a. \$29.35
- b. \$32.00
- c. \$90.00
- d. \$26.12
- e. \$25.79

Tough:

Zeros and expectations theory

Answer: d Diff: T

7A-14. A 2-year, zero coupon Treasury bond with a maturity value of \$1,000 has a price of \$873.4387. A 1-year, zero coupon Treasury bond with a maturity value of \$1,000 has a price of \$938.9671. If the pure expectations theory is correct, for what price should 1-year, zero coupon Treasury bonds sell one year from now?

- a. \$798.89
- b. \$824.66
- c. \$852.28
- d. \$930.23
- e. \$989.11

Zeros and expectations theory

Answer: a Diff: T

7A-15. A 4-year, zero coupon Treasury bond sells at a price of \$762.8952. A 3-year, zero coupon Treasury bond sells at a price of \$827.8491. Assuming the expectations theory is correct, what does the market believe the price of 1-year, zero coupon bonds will be in three years?

- a. \$921.66
- b. \$934.58
- c. \$938.97
- d. \$945.26
- e. \$950.47

Zero coupon bond

Answer: d Diff: T

7A-16. Assume that the State of Florida sold tax-exempt, zero coupon bonds with a \$1,000 maturity value 5 years ago. The bonds had a 25-year maturity when they were issued, and the interest rate built into the issue was a nominal 8 percent, compounded semiannually. The bonds are now callable at a premium of 4 percent over the accrued value. What effective annual rate of return would an investor who bought the bonds when they were issued and who still owns them earn if they were called today?

- a. 4.41%
- b. 6.73%
- c. 8.25%
- d. 9.01%
- e. 9.52%

Zero coupon bond**Answer: e Diff: T**

7A-17. Assume that the City of Tampa sold an issue of \$1,000 maturity value, tax exempt (muni), zero coupon bonds 5 years ago. The bonds had a 25-year maturity when they were issued, and the interest rate built into the issue was a nominal 10 percent, but with semiannual compounding. The bonds are now callable at a premium of 10 percent over the accrued value. What effective annual rate of return would an investor who bought the bonds when they were issued and who still owns them earn if they were called today?

- a. 12.01%
- b. 10.25%
- c. 10.00%
- d. 11.63%
- e. 12.37%

Taxes on zero coupon bond**Answer: a Diff: T**

7A-18. Schiffauer Electronics plans to issue 10-year, zero coupon bonds with a par value of \$1,000 and a yield to maturity of 9.5 percent. The company has a tax rate of 30 percent. How much extra in taxes would the company pay (or save) the second year (at $t = 2$) if they go ahead and issue the bonds?

- a. Save \$12.59
- b. Save \$13.79
- c. Save \$41.97
- d. No savings
- e. Pay \$13.79

Multiple Part:

(The information below applies to the next two problems.)

Gargoyle Unlimited is planning to issue a zero coupon bond to fund a project that will yield its first positive cash flow in three years. That cash flow will be sufficient to pay off the entire debt issue. The bond's par value will be \$1,000, it will mature in 3 years, and it will sell in the market for \$727.25. The firm's marginal tax rate is 40 percent.

Zero coupon interest tax shield**Answer: b Diff: T**

7A-19. What is the nominal dollar value of the interest tax savings to the firm in the third year of the issue?

- a. \$ 32.58
- b. \$ 40.29
- c. \$100.72
- d. \$ 60.43
- e. \$109.10

After-tax cost of debt

Answer: c Diff: M

7A-20. What is the expected after-tax cost of this debt issue?

- a. 11.20%
- b. 4.48%
- c. 6.72%
- d. 6.10%
- e. 4.00%

Web Appendix 7B

Multiple Choice: Conceptual

Medium:

Liquidation procedures

Answer: e Diff: M

7B-1. Chapter 7 of the Bankruptcy Act is designed to do which of the following?

- a. Provide safeguards against the withdrawal of assets by the owners of the bankrupt firm.
- b. Establish the rules of reorganization for firms with projected cash flows that eventually will be sufficient to meet debt payments.
- c. Allow insolvent debtors to discharge all of their obligations and to start over unhampered by a burden of prior debt.
- d. Statements a and b are correct.
- e. Statements a and c are correct.

Bankruptcy law

Answer: d Diff: M

7B-2. Which of the following statements is most correct?

- a. Our bankruptcy laws were enacted in the 1800s, revised in the 1930s, and have remained unaltered since that time.
- b. Federal bankruptcy law deals only with corporate bankruptcies. Municipal and personal bankruptcy are governed solely by state laws.
- c. All bankruptcy petitions are filed by creditors seeking to protect their claims on firms in financial distress. Thus, all bankruptcy petitions are involuntary as viewed from the perspective of the firm's management.
- d. Chapters 11 and 7 are the most important bankruptcy chapters for financial management purposes. If a reorganization plan cannot be worked out under Chapter 11, then the company will be liquidated as prescribed in Chapter 7 of the Act.
- e. "Restructuring" a firm's debt can involve forgiving a certain portion of the debt but does not involve changing the debt's maturity or its contractual interest rate.

Bankruptcy issues**Answer: e Diff: M**

7B-3. Which of the following statements is most correct?

- a. The primary test of feasibility in a reorganization is whether every claimant agrees with the reorganization plan.
- b. The basic doctrine of fairness states that all debt holders must be treated equally.
- c. Since the primary issue in bankruptcy is to determine the sharing of losses between owners and creditors, the "public interest" is not a relevant concern.
- d. While the firm is in bankruptcy, the existing management is always allowed to remain in control of the firm, though the court monitors its actions closely.
- e. To a large extent, the decision to dissolve a firm through liquidation or to keep it alive through reorganization depends on a determination of the value of the firm if it is rehabilitated versus the value of its assets if they are sold off individually.

Tough:**Priority of claims****Answer: c Diff: T**

7B-4. What would be the priority of the claims as to the distribution of assets in a liquidation under Chapter 7 of the Bankruptcy Act?

1. Trustees' costs to administer and operate the firm.
 2. Common stockholders.
 3. General, or unsecured, creditors.
 4. Secured creditors who have claim to the proceeds from the sale of a specific property pledged for a mortgage.
 5. Taxes due to federal and state governments.
-
- a. 1, 4, 3, 5, 2
 - b. 5, 4, 1, 3, 2
 - c. 4, 1, 5, 3, 2
 - d. 5, 1, 4, 2, 3
 - e. 1, 5, 4, 3, 2

CHAPTER 7 ANSWERS AND SOLUTIONS
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1. **Interest rates** **Answer: e Diff: E**

2. **Interest rates and bond prices** **Answer: c Diff: E**

Statement a is false; just the reverse is true. Statement b is false; the 15-year bond is selling at a discount because its coupon payment is less than the YTM. Statement c is true; longer-maturity and lower-coupon bonds have a larger percentage price change than short-maturity, high-coupon bonds. Statement d is false; just the reverse is true.

3. **Interest rates and bond prices** **Answer: c Diff: E**

If the going market interest rate (YTM) is 7 percent, but the coupon rate is 9 percent, then investors are getting a better coupon payment from this bond than they could from a new bond issued in the market today. Therefore, this bond is more valuable and must be selling at a premium. Therefore, statement a is false. Whenever interest rates fall, the price of a bond increases. Therefore, statement b is false. If interest rates remain unchanged, as the bond gets closer to its maturity, its price will approach par value. Since the bond is selling at a premium, its price must decline to its par value as it gets closer to maturity. Therefore, statement c is true.

4. **Interest rates and bond prices** **Answer: d Diff: E**

First, both bonds will decrease in price. Longer-maturity, lower-coupon bonds have greater price changes with rate movements than shorter-maturity, higher-coupon bonds. So statement d must be correct.

5. **Interest vs. reinvestment rate risk** **Answer: e Diff: E**

Statements a, b, c, and d are all correct. Therefore, the correct choice is statement e.

6. Interest vs. reinvestment rate risk **Answer: c Diff: E**

Interest rate risk means the risk that the price of the bond will change due to interest rate changes. The longer the maturity, the greater the interest rate risk. Reinvestment rate risk is the risk that once the bond matures, you won't be able to reinvest the principal at the same rate. The shorter the maturity, the greater the reinvestment rate risk. Statement a is false. Long-term bonds have more interest rate risk and less reinvestment rate risk than short-term bonds. Statement b is false. Long-term bonds have less reinvestment rate risk than short-term bonds. Statement c is true. Zeros have more interest rate risk because their one payment is subject to the maximum number of discounting periods, so the zero's price will fluctuate greatly whenever interest rates change. There is less reinvestment rate risk because there are no coupons that need to be reinvested, just the par value at maturity. Statement d is false. If interest rates increase, the prices of all bonds will decrease. Statement e is false. You have to pay taxes on the difference in the accreted value of the zeros each year, as though you had actually realized the capital gain for the year. You don't actually realize your capital gain until maturity, or until you sell the bond, but you still pay taxes as though you had.

7. Price risk **Answer: a Diff: E**

The longer the maturity of a bond, the more of an effect a change in interest rates will have on it. The reason for this is that the price change is compounded into the bond price for more periods. Therefore, you can rule out statements b and e. A bond that pays coupons will be less affected by interest rate changes than one that doesn't pay coupons. The bond price is the NPV of all the future cash flows, both the coupon payments and the par value paid at maturity. The first coupon payment is only discounted one period. The second coupon is discounted two periods, and so on. The par value is discounted for the full life of the bond. Thus, statements c and d can be eliminated. Since a zero coupon bond's price today is determined just by the NPV of its par value, all of its payment is discounted for the maximum amount of time, whereas a coupon bond has many payments discounted for less than the maximum amount of time. Therefore, a zero coupon bond is most affected by interest rate changes. So, the longest zero coupon bond is the correct answer, which is statement a.

8. Callable bond **Answer: a Diff: E**

Statement a is correct; the other statements are false. A bond down-grade generally raises the cost of issuing new debt. Therefore, the callable bonds would not be called. If the call premium (the cost paid in excess of par) increases, the cost of calling debt increases; therefore, callable bonds would not be called.

9. Call provision **Answer: b Diff: E**

10. Bond coupon rate **Answer: c Diff: E**

- 11. Bond concepts** **Answer: a Diff: E**

Statement a is correct; the other statements are false. A bond's price and YTM are negatively related. If a bond's YTM is greater than its coupon rate, it will sell at a discount.

- 12. Bond concepts** **Answer: c Diff: E**

Statement c is correct; the other statements are false. If a bond's YTM > annual coupon, then it will trade at a discount. If interest rates increase, the 10-year zero coupon bond's price change is greater than the 10-year coupon bond's.

- 13. Bond concepts** **Answer: e Diff: E**

All the statements are true; therefore, the correct choice is statement e. Since the bond is selling at par, its YTM = coupon rate. The current yield is calculated as $\$90/\$1,000 = 9\%$. If YTM = coupon rate, the bond will sell at par. So, if the bond's YTM remains constant the bond's price will remain at par.

- 14. Bond concepts** **Answer: a Diff: E**

If the bond is selling at a discount, the coupon rate must be less than the required yield on the bond. So statement a is correct. Statement b is false, because the price will increase towards \$1,000. Statement c can only be correct if the bond is trading at par, and it isn't.

- 15. Bond concepts** **Answer: d Diff: E**

The bond has a coupon rate higher than the YTM, so it must be trading at a price above its par value. Statement a is incorrect; its current yield = $\text{Coupon}/\text{Price}$, which will be less than 8 percent because the price is greater than par. Statement b is correct. Statement c is also correct; the price of the bond will decline over time because it is currently trading above par. Therefore, statement d is the best answer.

- 16. Bond concepts** **Answer: a Diff: E**

Since Bond B sells at par, then the coupon rate on Bond B equals its YTM. Therefore, its YTM is 10 percent. Since all the bonds have the same risk and the yield curve is steady, the YTM for Bonds A and C will also be 10 percent. Because Bond A has an 8 percent coupon, it must be trading at a discount and its price will increase over time towards the par value. Because Bond C has a coupon rate of 12 percent, it must be trading at a premium and its price will decline over time towards the par value. The only correct answer is statement a.

17. **Bond concepts**

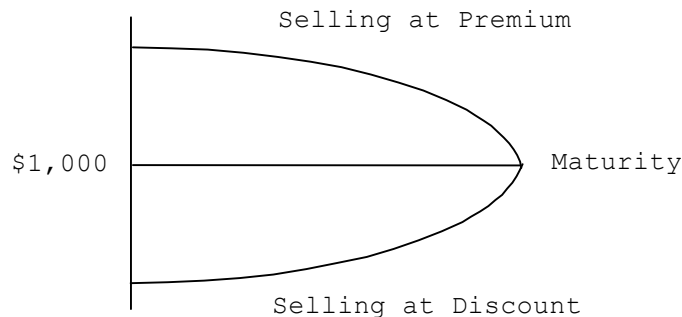
Answer: d Diff: E

Statement a is false. If the YTM is 8 percent, and A's coupon payment is only 7 percent, investors will find A to be less valuable than a new par value bond with an 8 percent coupon. Therefore, A will be selling for less than its par value (at a discount). If the YTM is 8 percent and B's coupon payment is 9 percent, investors will find B to be more valuable than a new par value bond with an 8 percent coupon. Therefore, B will be selling for more than its par value (at a premium). Therefore, B's price must be higher than A's. Statement b is false. The bonds will not have the same price until expiration, when the price of each will be its par value of \$1,000. Statement c is false. Bond B is selling at a higher price than Bond A from the statements given in the problem. Statement d is correct. If a bond is selling at a discount, over time its price will increase until it reaches its par value at expiration. Since Bond A is selling at a discount this statement is true. Statement e is false. The total yield on the bond will be the sum of the capital gains yield and the current yield. If it has a positive capital gains yield, and it will since A is selling at a discount, its current yield must be less than 8 percent because the sum of the two yields must equal 8 percent.

18. **Bond concepts**

Answer: c Diff: E

If the YTM is lower than the coupon rate, then this bond gives higher coupon payments than the "going rate." Therefore, it is more valuable, and will sell at a premium. So, statement a is false. The current yield is the bond's annual coupon payments divided by the bond's price today: $\text{Current yield} = \frac{\text{Annual coupon payment}}{\text{Current price}}$. Since we know that the bond is selling at a premium, it will be selling for a higher price than \$1,000. If the bond were selling at par (\$1,000), then the current yield would be the same as the coupon rate. Since it is selling at a premium, the denominator of the current yield equation is larger, making the current yield smaller. Therefore, statement b is false. Since the bond is selling at a premium, its price will decrease through time until its price equals the par value, just at maturity. Remember the following diagram:



Therefore, statement c is the correct choice.

19. Bond concepts

Answer: a Diff: E N

Statement a is correct. Statement b is incorrect; just the opposite is true. Bonds with higher coupons have less interest rate price risk but more reinvestment rate risk. Statement c is incorrect; the price of a discount bond will continue to change, based on years to maturity. As a discount bond approaches maturity, its price will increase to its par value. Clearly, then, statements d and e are also incorrect.

20. Bond concepts

Answer: d Diff: E N

The correct answer is statement d. All of the statements are correct. All of the statements directly follow from the basics of bond pricing presented in the text.

21. Bond yield

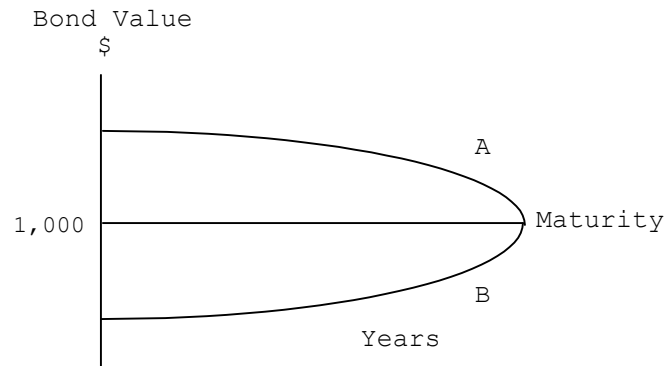
Answer: a Diff: E

If the bond sells at a premium, its price will decline as it approaches maturity. (Remember that at maturity it has to be worth its par value.) Therefore, statement a is true. The current yield is defined as the coupon payment divided by the price. If the bond is selling at a premium, then its price will have to decline over time. If its price is declining, then there is a negative capital gains yield. Remember that YTM will equal the capital gains yield plus the current yield. Therefore, for YTM to be 8 percent with a negative capital gains yield, the current yield must be higher than 8 percent. Therefore, statement b is false. If the bond is trading at a premium and the YTM is constant, it will have to slowly decline in value until, just at maturity, it is worth its par value. Therefore, statement c is false. If the bond's coupon rate were less than the YTM, it would be less valuable than new bonds issued at the YTM and would, therefore, trade at a discount, not a premium. Therefore, statement d is false. If the YTM increases, then this bond's cash flows (coupons) will be discounted at a higher rate and will be worth less. Therefore, the price will decrease, not increase. Therefore, statement e is false.

22. Bond yields and prices

Answer: d Diff: E

If the YTM is 7 percent, this is the market interest rate. Therefore, Bond A's coupon rate is higher than the market rate, so it must be selling above par (at a premium). Bond B's coupon rate is lower than the market rate, so it must be selling below par (at a discount).



Statement a is false. If the YTM remains the same, the price of Bond A will fall, and the price of bond B will rise. The total yield of 7 percent on both bonds will consist of a capital gains yield and a current yield. The sum of these two yields will be 7 percent. Statements b, c, and e are false for the reason mentioned above. Therefore, the correct answer is statement d.

23. Sinking fund provision

Answer: e Diff: E

Statement a is false; sinking funds require companies to retire a certain portion of their debt annually. Statement b is true; if interest rates have declined, companies will call the bonds and investors will have to reinvest at lower rates. Statement c is true; if interest rates have risen (causing bond prices to fall) the company will buy bonds back in the open market. Statements b and c are true; therefore, statement e is the correct choice.

24. Sinking fund provision

Answer: d Diff: E

Statements a and c are correct; therefore, statement d is the correct choice. Bonds will be purchased on the open market when they are selling at a discount and will be called for redemption when the price of the bonds exceeds the redemption price.

25. Types of debt

Answer: e Diff: E

Statement e is correct; the others are false. Junk bonds have a higher yield to maturity relative to investment grade bonds. A debenture is an unsecured bond, while subordinated debt has greater default risk than senior debt.

26. Bond yield

Answer: b Diff: M

27. Bond yield **Answer: c Diff: M**

Statement c is correct; the other statements are false. By definition, if a coupon bond is selling at par its current yield will equal its yield to maturity. If we let Bond A be a 5-year, 12% coupon bond that sells at par, its current yield equals its YTM which equals 12%. If we let Bond B be a 5-year, 10% coupon bond (in a 12% interest rate environment) the bond will sell for \$927.90. Its current yield equals 10.78% ($\$100/\927.90), but its yield to maturity equals 12%. The YTC is a better measure of return than the YTM if the bond is selling at a premium.

28. Price risk **Answer: c Diff: M**

Statement c is correct; the other statements are incorrect. Long-term, low-coupon bonds are most affected by changes in interest rates; therefore, of the bonds listed, the 10-year zero coupon bond will have the largest percentage increase in price.

29. Price risk **Answer: c Diff: M**

Statement c is correct; the other statements are false. Zero coupon bonds have greater price risk than either of the coupon bonds or the annuity.

30. Price risk **Answer: c Diff: M**

Statement c is correct; the other statements are false. All other things equal, a zero coupon bond will experience a larger percentage change in value for a given change in interest rates than will a coupon-bearing bond. Further, bonds with long remaining lives experience greater percentage changes in value than do bonds with short remaining lives. Thus, of the bonds listed, the 10-year zero coupon bond has the largest percentage increase in value.

31. Price risk **Answer: a Diff: M**

Statement a is correct. All other things equal, a zero coupon bond will experience a larger percentage change in value for a given change in interest rates than will a coupon-bearing bond. Further, bonds with long remaining lives experience greater percentage changes in value than do bonds with short remaining lives. Thus, of the bonds listed, the 10-year zero coupon bond has the largest percentage increase in value.

32. Price risk **Answer: a Diff: M**

Statement a is correct. The longer the maturity and the lower the coupon of a bond, the more sensitive it is to interest rate (price) risk. The bond in answer a has a maturity greater than or equal to and a coupon less than or equal to all the other bonds.

33. Price risk **Answer: a Diff: M**

Statement a is correct. The bond with the smallest coupon and longest maturity will be most sensitive to changes in interest rates.

34. Bond concepts **Answer: e Diff: M**

The correct answer is e; the other statements are false. A zero coupon bond will always sell at a discount below par, provided interest rates are above zero, which they always are.

35. Bond concepts **Answer: d Diff: M**

Statements a and c are correct; therefore, statement d is the correct choice. If inflation were to increase, interest rates would rise, thus bond prices would decline.

36. Bond concepts **Answer: b Diff: M**

Statement b is correct; the other statements are false. If a bond is selling at a premium, the YTM would be less than the coupon rate. In addition, as long as interest rates are greater than zero, zeros should never trade above par.

37. Bond concepts **Answer: b Diff: M**

Statement b is correct; the other statements are false. If a bond's coupon rate > than the required rate, the bond will sell at a premium. A bond's total return includes both an interest yield and a capital gains component, which represents the change in the price of the bond over a given year.

38. Bond concepts **Answer: e Diff: M**

39. Bond concepts **Answer: d Diff: M**

Statements a and c are correct; therefore, statement d is the correct choice. Statement a is correct. From the information given, we can solve for the price of the bond = \$887. Current yield = $\$100/\$887 = 11.274\%$. Statement b is incorrect; since the bond is selling at a discount its YTC > YTM. The YTC = 14.05%. Statement c is correct. From the information given, since the coupon rate < YTM we know the bond is selling at a discount. $V_B = \$887.00$.

40. Bond concepts

Answer: d Diff: M N

The correct answer is statement d. Bonds with a lower coupon have a lower reinvestment rate risk. Bonds with longer maturities have a lower reinvestment rate risk. Since all three bonds have the same maturity, the one with the highest coupon will have the highest reinvestment rate risk. Bond Z has the highest coupon, so statement a is false. If market interest rates remain unchanged, discount bonds ($CPN < YTM$) will go up in price, while premium bonds ($CPN > YTM$) will go down in price. Bond Z is selling at a premium, so its price will decline (if interest rates are unchanged). Therefore, statement b is false. If market interest rates increase, the prices of all bonds will decrease, therefore, statement c is incorrect. Statement d is correct from the information given above in response to statement b. If market interest rates decline, all bonds will have an increase in price. The one with the largest percentage increase will be the one with the most price risk. As maturity increases, price risk increases. As coupon decreases, price risk increases. Since all three bonds have the same maturity, the one with the lowest coupon will have the greatest price risk. Therefore, Bond X will have the largest percentage increase in price, so statement e is false.

41. Bond concepts

Answer: b Diff: M N

The correct answer is statement b. If the YTM remains constant, the price of Bond A will still exceed par, the price of Bond B will equal par, and the price of Bond C will be below par. So, statement a is incorrect. As the YTM rises, the price of all bonds will decrease. So, statement b is correct. If the YTM decreases, Bond C will have the largest percentage increase in price since its price is the lowest of the three bonds. Bond B will follow, and Bond A will have the lowest percentage increase in price. So, statement c is incorrect.

42. Interest rates and bond prices

Answer: e Diff: M N

The correct answer is statement e. Statement a is incorrect; Bond A is a premium bond, while Bond B is a discount bond. Statement b is incorrect; because Bond A is at a premium its price will decline one year from now, while Bond B's price will increase one year from now because it is a discount bond. Statement c is also incorrect; the two bonds have the same maturity, but Bond B has the lower coupon so it will experience the greatest increase in value. Therefore, statement e is the correct choice.

43. Callable bond

Answer: d Diff: M

44. Callable bond

Answer: b Diff: M

Statement b is correct; the other statements are false. The bonds' prices would differ substantially only if investors think a call is likely, in which case investors would have to give up a high coupon bond. Calls are most likely if the current market rate is well below the coupon rate. Note that if the current rate is above the coupon rate, the bond won't be called.

45. **Types of debt and their relative costs** **Answer: c Diff: M**

46. **Miscellaneous concepts** **Answer: c Diff: M**

Statement c is correct; the other statements are false. Bankrupt firms often are reorganized rather than liquidated. Firms prefer the less expensive option of calling the bonds--which in this case is the sinking fund call price. Interest expense accrues for tax purposes on zero coupon bonds, so firms can realize the tax savings from issuing debt. Callable bonds will sell for a higher yield than noncallable bonds, if all other things are held constant.

47. **Miscellaneous concepts** **Answer: b Diff: M**

48. **Miscellaneous concepts** **Answer: e Diff: M**

Statements a and b are both correct; therefore statement e is the correct choice. Low-coupon bonds have less reinvestment rate risk than high coupon bonds. If the bond is trading at a premium, then its coupon rate is high in relation to current interest rates. The issuer would be likely to call the bond and issue new bonds at the lower current interest rate. Thus, we would expect to earn the yield to call.

49. **Current yield and yield to maturity** **Answer: e Diff: M**

Statement e is the correct choice. If a bond sells for less than par, then its yield to maturity will exceed its coupon rate. If a bond sells at par, then its current yield, yield to maturity, and coupon rate are all the same. The bond selling for more than par will have a lower current yield than a bond selling at par. However, the bond selling for more than par will have a negative capital gain (that is, a capital loss) while the bond selling at par will have no capital gain.

50. **Current yield and yield to maturity** **Answer: a Diff: M**

Statement a is correct; the other statements are false. If the bond sells for a premium, this implies that the YTM must be less than the coupon rate. As a bond approaches maturity, its price will move towards the par value.

51. **Corporate bonds and default risk** **Answer: c Diff: M**

Statement c is the correct choice; the other statements are false. The expected return may be greater than, less than, or equal to the yield to maturity. Firms in financial distress may or may not eventually declare bankruptcy; that is, they may recover.

52. **Default risk and bankruptcy** **Answer: b Diff: M**

Statement b is the appropriate choice. An indenture is not a bond. It is a legal contract that spells out in detail the rights of both investors and the firm issuing debt.

53. **Default risk and bankruptcy** **Answer: b Diff: M**

54. **Default risk and bankruptcy** **Answer: d Diff: M**

Statements a and b are correct; therefore, statement d is the correct choice. Chapter 7 is liquidation. Chapter 11 is reorganization.

55. **Sinking funds and bankruptcy** **Answer: d Diff: M**

Statements a and c are correct; therefore, statement d is the correct choice. When the coupon rate is below the market rate, then the price is below par, so the firm will buy back its bonds on the open market. If interest rates have declined after the issuance of a bond, then the bond has a coupon rate higher than the going market interest rate. Therefore, investors are being paid a higher rate than current interest rates and they would prefer to keep the bonds to receive a higher return.

56. **Bond yields and prices** **Answer: b Diff: T**

Statement b is correct. If a bond's YTM exceeds its coupon rate, then, by definition, the bond sells at a discount. Thus, the bond's price is less than its maturity value. Statement a is false. Consider zero coupon bonds. A zero coupon bond's YTM exceeds its coupon rate (which is equal to zero); however, its current yield is equal to zero which is equal to its coupon rate. Statement c is false; a bond's value is determined by its cash flows: coupon payments plus principal. If the 2 bonds have different coupon payments, their prices would have to be different in order for them to have the same YTM.

57. **Bond concepts** **Answer: b Diff: T**

58. **Bond concepts** **Answer: e Diff: T**

Statements a and c are correct; therefore, Statement e is the correct choice. The longer the maturity of a bond, the greater the impact an increase in interest rates will have on the bond's price. Statement b is false. To see this, assume interest rates increase from 7 percent to 10 percent. Evaluate the change in the prices of a 10-year, 5 percent coupon bond and a 10-year, 12 percent coupon bond. The 5 percent coupon bond's price decreases by 19.4 percent, while the 12 percent coupon bond's price decreases by only 16.9 percent. Statement c is correct. To see this, evaluate a 10-year, zero coupon bond and a 9-year, 10 percent annual coupon bond at 2 different interest rates, say 7 percent and 10 percent. The zero coupon bond's price decreases by 24.16 percent, while the 9-year, 10 percent coupon bond's price decreases by only 16.35 percent.

59. Interest vs. reinvestment rate risk

Answer: c Diff: T

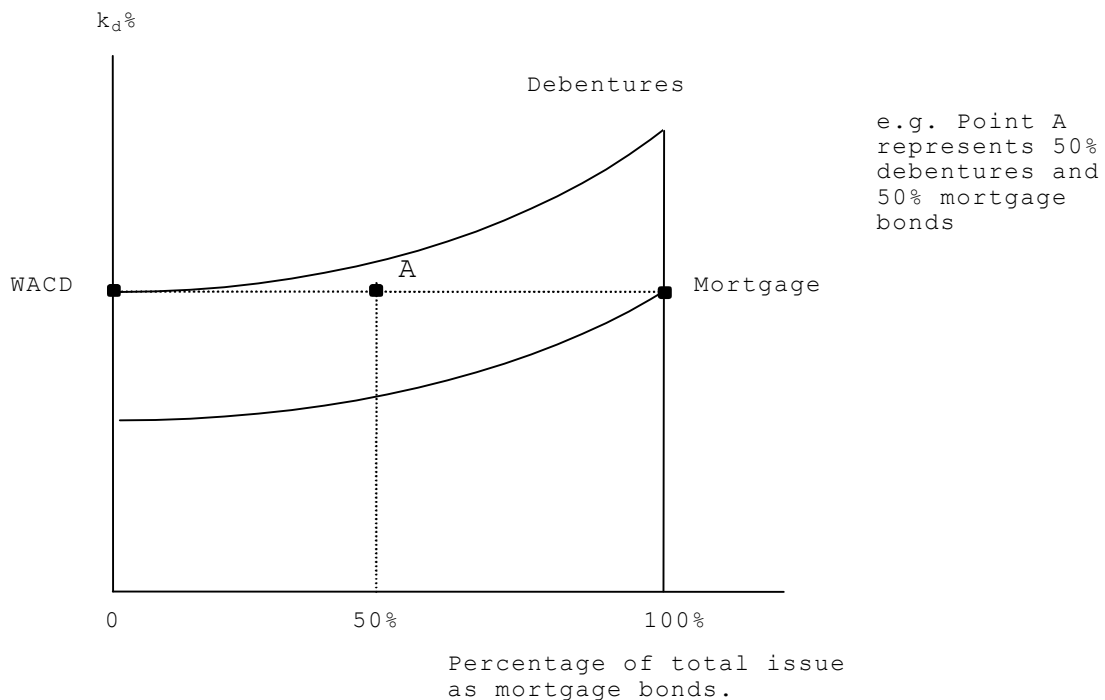
Statement c is correct. For example, assume these coupon bonds have 10 years until maturity and the current interest rate is 12 percent. The 5 percent coupon bond's value is \$604.48, while the 10 percent coupon bond's value is \$887.00. Thus, the lower-coupon bond has more interest rate risk than the higher-coupon bond. The lower the coupon, the greater the percentage of the cash flow that will come in the later years (from the maturity value), hence, the greater the impact of interest rate changes. Statement a is false--as we demonstrated above. Statement b is false--shorter-term bonds have more reinvestment rate risk than longer-term bonds because the principal payment must be reinvested sooner on the shorter-term bond. Statement d is false--as we demonstrated earlier. Statement e is false because perpetuities have no maturity date; therefore, they have more interest rate risk than zero coupon bonds. The longer a security's maturity, the greater its interest rate risk.

60. Bond indenture

Answer: d Diff: T

61. Types of debt and their relative costs

Answer: e Diff: T



1. Company can't lower its total cost of the \$100 million of debt very much, if any, by the mix of debentures and mortgage bonds.
2. Debentures' risk rises as mortgage debt rises.
3. Mortgage bonds' risk rises as more mortgage bonds are issued.
4. So, the "WACD" will likely remain fairly stable.

62. **Annual coupon rate** **Answer: d Diff: E N**

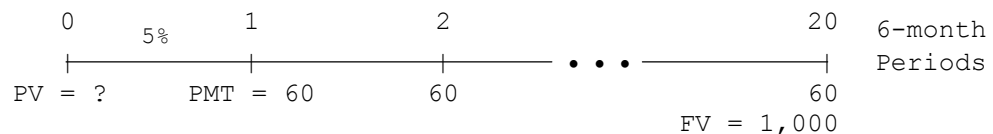
We must solve for the payment and infer the coupon rate from that value. Enter the following data into your financial calculator:
 $N = 10$; $I = 9$; $PV = -903.7351$; $FV = 1000$; and then solve for $PMT = \$75$. Hence, the coupon rate is $\$75/\$1,000 = 7.5\%$.

63. **Bond value--annual payment** **Answer: d Diff: E**

Enter the following input data in the calculator:
 $N = 12$; $I = 8$; $PMT = 90$; $FV = 1000$; and then solve for $PV = -\$1,075.36$. $V_B \approx \$1,075$.

64. **Bond value--semiannual payment** **Answer: e Diff: E**

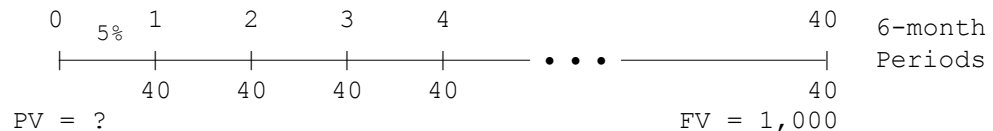
Time Line:



Financial calculator solution:
 Inputs: $N = 20$; $I = 5$; $PMT = 60$; $FV = 1000$.
 Output: $PV = -\$1,124.62$; $V_B = \$1,124.62$.

65. **Bond value--semiannual payment** **Answer: d Diff: E**

Time Line:



Financial calculator solution:
 Inputs: $N = 40$; $I = 5$; $PMT = 40$; $FV = 1000$.
 Output: $PV = -\$828.41$; $V_B \approx \$828$.

66. **Bond value--semiannual payment** **Answer: e Diff: E N**

This is a straight-forward bond valuation, just remember that the bond has semiannual coupons. Enter the following data into your financial calculator:
 $N = 12 \times 2 = 24$; $I = 8 \div 2 = 4$; $PMT = 90 \div 2 = 45$; $FV = 1000$; and then solve for $PV = -\$1,076.23$. $V_B = \$1,076.23$.

67. **Bond value--semiannual payment** **Answer: b Diff: E N**

Using your financial calculator, enter the following data as inputs:
 $N = 2 \times 10 = 20$; $I = 9/2 = 4.5$; $PMT = 0.08/2 \times 1,000 = 40$; $FV = 1000$; and then solve for $PV = -\$934.96$. $V_B = \$934.96$.

68. **Bond value--semiannual payment** **Answer: c Diff: E**

$N = 10 \times 2 = 20$; $I = 9/2 = 4.5$; $PMT = 50$; $FV = 1000$; and then solve for $PV = -\$1,065.04$. $V_B = \$1,065.04$.

69. **Bond value--semiannual payment** **Answer: b Diff: E**

$N = 15 \times 2 = 30$; $I/YR = 11/2 = 5.5$; $PMT = 1,000 \times 0.08/2 = 40$; $FV = 1000$; and then solve for $PV = -\$781.99$. $V_B = \$781.99$.

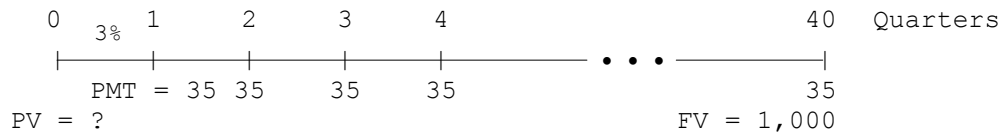
70. **Bond value--semiannual payment** **Answer: c Diff: E N**

Enter the following data inputs into the calculator:

$N = 24$; $I/Yr = 7/2 = 3.5$; $PMT = 40$; $FV = 1000$; and then solve for $PV = -\$1,080.29$. $V_B = \$1,080.29$.

71. **Bond value--quarterly payment** **Answer: c Diff: E**

Time Line:



Financial calculator solution:

Inputs: $N = 40$; $I = 3$; $PMT = 35$; $FV = 1000$.

Output: $PV = -\$1,115.57$; $V_B = \$1,115.57$.

72. **Yield to maturity--annual bond** **Answer: a Diff: E**

Enter $N = 11$; $PV = -865$; $PMT = 80$; $FV = 1000$; and then solve for $I/YR = 10.0868\% \approx 10.09\%$.

73. **Yield to maturity--semiannual bond** **Answer: c Diff: E**

$N = 12 \times 2 = 24$; $PV = -1080$; $PMT = 50$; $FV = 1000$; and then solve for $I = 4.4508\% \times 2 = 8.9016\%$.

74. **Yield to maturity--semiannual bond** **Answer: b Diff: E**

Enter the following input data in the calculator:

$N = 18$; $PV = -920$; $PMT = 35$; $FV = 1000$; and then solve for $I/YR = 4.1391\%$. Convert this semiannual periodic rate to a nominal annual rate, $4.1391\% \times 2 = 8.2782\% \approx 8.28\%$.

75. **YTM and YTC--semiannual bond** **Answer: e Diff: E**

To calculate YTM:

$N = 28$; $PV = -1075$; $PMT = 40$; $FV = 1000$; and then solve for $I/YR = 3.57\%$
 $\times 2 = 7.14\%$.

To calculate YTC:

$N = 10$; $PV = -1075$; $PMT = 40$; $FV = 1050$; and then solve for $I/YR = 3.52\%$
 $\times 2 = 7.05\%$.

76. **Yield to maturity and bond value--annual bond** **Answer: d Diff: E**

Step 1: Find the YTM. $N = 20$; $PV = -925$; $PMT = 90$; $FV = 1000$; and then solve for $I = YTM = 9.8733\%$.

Step 2: Solve for P_5 . In 5 years, there will be 15 years left until maturity, so the price at $t = 5$ is: $N = 15$; $I/YR = 9.8733\%$; $PMT = 90$; $FV = 1000$; and then solve for $PV = -\$933.09$. $V_B = \$933.09$.

77. **Current yield** **Answer: b Diff: E**

Current yield = Annual coupon payment/Current price.

Step 1: Find the price of the bond:

$N = 9$; $I/YR = 10$; $PMT = 70$; $FV = 1000$; and then solve for $PV = -\$827.23$. $V_B = \$827.23$.

Step 2: Calculate the current yield: $CY = \$70/\$827.23 = 8.46\%$.

78. **Current yield** **Answer: d Diff: E**

Current yield = Annual coupon payment/Current price.

Step 1: Find the price of the bond:

$N = 12$; $I/YR = 9.5$; $PMT = 85$; $FV = 1000$; and then solve for $PV = -\$930$. $V_B = \$930$.

Step 2: Calculate the current yield: $CY = \$85/\$930 = 9.14\%$.

79. **Current yield** **Answer: c Diff: E**

The current yield is equal to the annual coupon divided by the price. The annual coupon is given: $0.08 \times \$1,000 = \80 . You need to find the price before calculating the current yield.

Step 1: Using the TVM inputs of your calculator, find the bond's price: $N = 15$; $I = 7$; $PMT = 80$; $FV = 1000$; and then solve for $PV = -\$1,091.08$. $V_B = \$1,091.08$.

Step 2: Calculate the bond's current yield:

Current yield = Annual coupon/Current price
Current yield = $\$80/\$1,091.08$
= 7.33% .

80. Current yield and yield to maturity **Answer: b Diff: E**

Current yield is calculated as: $\$80/\$985 = 8.12\%$.

$N = 12$; $PV = -985$; $PMT = 80$; $FV = 1000$; and then solve for I/YR (YTM) = 8.20%.

81. Future bond value--annual payment **Answer: b Diff: E N**

Two years from now, there will be 8 years left to maturity. Use your financial calculator to determine its price by entering the following data as inputs:

$N = 8$; $I = 10$; $PMT = 80$; $FV = 1000$; and then solve for $PV = -\$893.30$.
 $V_B = \$893.30$.

82. Risk premium on bonds **Answer: c Diff: E**

Calculate the previous risk premium, RP_{BBB} , and new RP_{BBB} :

$RP_{BBB} = 11.5\% - 8.7\% = 2.8\%$.

New $RP_{BBB} = 2.8\%/2 = 1.4\%$.

Calculate new YTM on BBB bonds: $YTM_{BBB} = 7.8\% + 1.4\% = 9.2\%$.

83. Bond value--annual payment **Answer: e Diff: M**

The semiannual bond selling at par has a nominal yield to maturity equal to its annual coupon rate (you can check this). Thus the nominal YTM for the semiannual bond is 8%. To convert this to an effective annual rate for the annual bond:

$NOM\% = 8$; $P/YR = 2$; and then solve for $EFF\% = 8.16\%$.

We can now value the annual bond using this rate, as the nominal rate is the same as the effective rate when compounding occurs annually. Thus; $N = 6$; $I = 8.16$; $PMT = 80$; $FV = 1000$; and then solve for $PV = -\$992.64$.
 $V_B = \$992.64$.

84. Bond value--annual payment **Answer: a Diff: M**

Step 1: Determine the effective annual rate of return on the semiannual bond:

The semiannual bond has a YTM of 9 percent because it is selling at par. This is equivalent to an effective annual rate of $9.2025\% = [(1 + 0.09/2)^2 - 1]$.

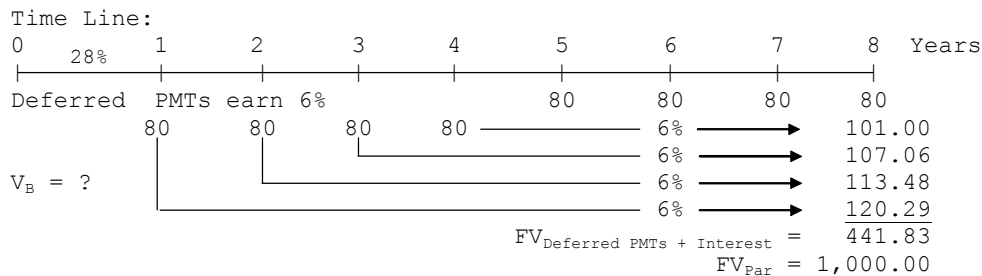
Step 2: Determine the value of the annual bond:

Enter the following input data in the calculator:

$N = 10$; $I = 9.2025$; $PMT = 90$; $FV = 1000$; and then solve for $PV = -\$987.12$. $V_B = \$987.12$.

85. Bond value--annual payment

Answer: d Diff: M



Numerical solution:

Find the compounded value at Year 8 of the postponed interest payments

$$FV_{Deferred\ interest} = \$80(1.06)^7 + \$80(1.06)^6 + \$80(1.06)^5 + \$80(1.06)^4 = \$441.83 \text{ payable at } t = 8.$$

Now find the value of the bond considering all cash flows

$$V_B = \$80(1/1.28)^5 + \$80(1/1.28)^6 + \$80(1/1.28)^7 + \$80(1/1.28)^8 + \$1,000(1/1.28)^8 + \$441.83(1/1.28)^8 = \$266.86.$$

Financial calculator solution:

Calculate FV of deferred interest in 2 steps:

Step 1: Inputs: $CF_0 = 0$; $CF_1 = 80$; $N_j = 4$; $CF_2 = 0$; $N_j = 4$; $I = 6$.
Output: $NFV = \$277.208$.

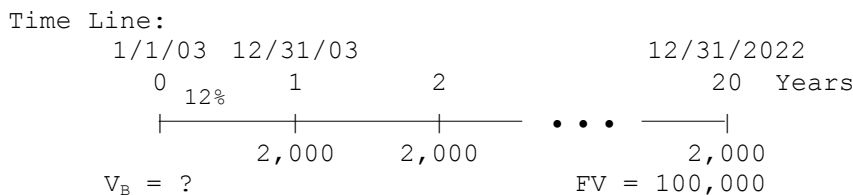
Step 2: Inputs: $N = 8$; $I = 6$; $PV = -277.208$; $PMT = 0$.
Output: $FV = \$441.828$.

Calculate V_B , which is the PV of scheduled interest, deferred accrued interest, and maturity value:

Inputs: $CF_0 = 0$; $CF_1 = 0$; $N_j = 4$; $CF_2 = 80$; $N_j = 3$; $CF_3 = 80 + 441.83 + 1,000 = 1521.83$; $I = 28$.
Output: $PV = \$266.88$; $V_B = \$266.88$.

86. Bond value--annual payment

Answer: a Diff: M



Financial calculator solution:

Calculate the PV of the bonds

Inputs: $N = 20$; $I = 12$; $PMT = 2000$; $FV = 100000$.
Output: $PV = -\$25,305.56$.

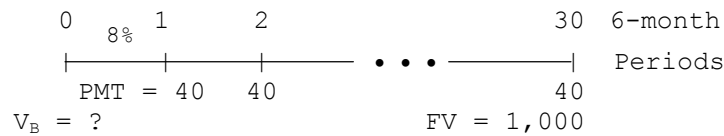
Calculate equal annuity due payments

BEGIN mode Inputs: $N = 2$; $I = 10$; $PV = -25305.56$; $FV = 0$.
Output: $PMT = \$13,255.29 \approx \$13,255$.

87. Bond value--semiannual payment

Answer: d Diff: M

Time Line:



Financial calculator solution:

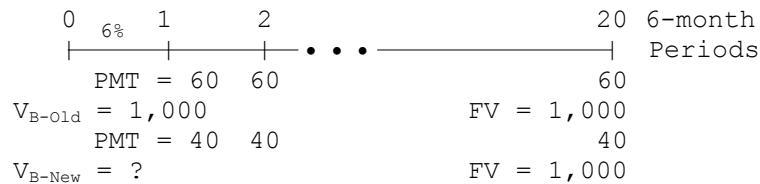
Inputs: $N = 30$; $I = 8$; $PMT = 40$; $FV = 1000$.

Output: $PV = -\$549.69$; $V_B = \$549.69 \approx \550 .

88. Bond value--semiannual payment

Answer: b Diff: M

Time Line:



Financial calculator solution:

Inputs: $N = 20$; $I = 6$; $PMT = 40$; $FV = 1000$.

Output: $PV = -\$770.60$; $V_B = \$770.60$.

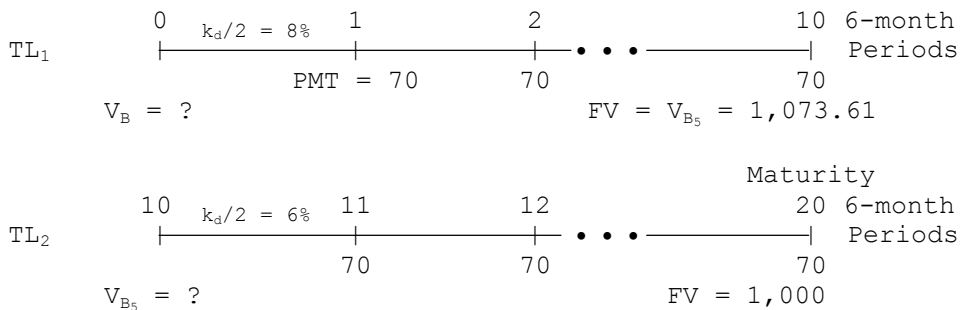
Number of bonds: $\$2,000,000 / \$770.60 \approx 2,596$ bonds.*

*Rounded up to next whole bond.

89. Bond value--semiannual payment

Answer: d Diff: M

Time Line:



Financial calculator solution:

Solve for V_B at Time = 5 (V_5) with 5 years to maturity

Inputs: $N = 10$; $I = 6$; $PMT = 70$; $FV = 1000$.

Output: $PV = -\$1,073.60$. $V_{B5} = \$1,073.60$.

Solve for V_B at Time = 0, assuming sale at $V_{B5} = \$1,073.60$.

Inputs: $N = 10$; $I = 8$; $PMT = 70$; $FV = 1073.60$.

Output: $PV = -\$966.99$; $V_B = \$966.99$.

- 94. Call price--quarterly payment** **Answer: c Diff: M**

First, solve for the bond price today as follows: $N = 10 \times 4 = 40$; $I = 8/4 = 2$; $PMT = 100/4 = 25$; $FV = 1000$; and then solve for $PV = -\$1,136.78$. $V_B = \$1,136.78$.

Now, the call price can be solved for as follows: $N = 5 \times 4 = 20$; $I = 7.5/4 = 1.875$; $PV = -1136.78$; $PMT = 25$; and then solve for $FV = \$1,048.34$.

- 95. Call price--semiannual payment** **Answer: e Diff: M**

Step 1: Find the bond price using the YTM:

Enter the following input data in the calculator:

$N = 30$; $I = 7.5/2 = 3.75$; $PMT = 0.10/2 \times 1,000 = 50$; $FV = 1000$; and then solve for $PV = -\$1,222.87$. $V_B = \$1,222.87$.

Step 2: Solve for the call price:

Enter the following input data in the calculator:

$N = 10$; $I = 5.54/2 = 2.77$; $PV = -1222.87$; $PMT = 50$; and then solve for $FV = \$1,039.938 \approx \$1,040$.

- 96. Yield to call** **Answer: a Diff: M**

Step 1: Find the price of the semiannual bond today using the YTM and other information given:

$N = 12 \times 2 = 24$; $I = 7.5/2 = 3.75$; $PMT = 45$; $FV = 1000$; and then solve for $PV = -\$1,117.3362$. $V_B = \$1,117.3362$.

Step 2: Given the bond's price, calculate the yield to call by entering the following data as inputs:

$N = 4 \times 2 = 8$; $PV = -1117.3362$; $PMT = 45$; $FV = 1045$; and then solve for $I = k/2 = 3.3073\%$ per 6 months

$k = 3.3073\% \times 2 = 6.6146\% \approx 6.61\%$.

- 97. Yield to call--annual bond** **Answer: a Diff: M**

First get the price based on the YTM:

$N = 12$; $I = 7.5$; $PMT = 90$; $FV = 1000$; and then solve for $PV = -\$1,116.03$. $V_B = \$1,116.03$.

Now solve for the YTC:

$N = 4$; $PV = -1116.03$; $PMT = 90$; $FV = 1050$; and then solve for $I = 6.73\%$.

- 98. Yield to call--annual bond** **Answer: b Diff: M**

The bond price today is found as $N = 11$; $I = 7.5$; $PMT = 80$; $FV = 1000$; and then solve for $PV = -\$1,036.58$. $V_B = \$1,036.58$.

Solve for the yield to call as follows: $N = 3$; $PV = -1036.58$; $PMT = 80$; $FV = 1060$; and then solve for $I = 8.41\%$.

99. Yield to call--semiannual bond **Answer: a Diff: M**

Step 1: Determine the stock's current price:
Use the YTM to find the price today. Enter the following input data in the calculator:

$N = 24$; $I = 7/2 = 3.5$; $PMT = 90/2 = 45$; $FV = 1000$; and then solve for $PV = -\$1,160.58$. $V_B = \$1,160.58$.

Step 2: Determine the bond's yield to call:
Use the PV found in Step 1 to find the YTC.

Enter the following input data in the calculator:
 $N = 6$; $PV = -1160.58$; $PMT = 90/2 = 45$; $FV = 1045$; and then solve for $I = 2.311\%$ per 6 months or $2 \times 2.311\% = 4.622\% \approx 4.62\%$.

100. Yield to call--semiannual bond **Answer: b Diff: M**

First, calculate the bond price as follows: $N = 20 \times 2 = 40$; $I = 7/2 = 3.5$; $PMT = 0.08/2 \times 1,000 = 40$; $FV = 1000$; and then solve for $PV = -\$1,106.78$. $V_B = \$1,106.78$.

Now, we can calculate the YTC as follows, recognizing that the bond can be called in 6 years at a call price of $115\% \times 1,000 = 1,150$: $N = 6 \times 2 = 12$; $PV = -1106.78$; $PMT = 40$; $FV = 1150$; and then solve for $I = 3.8758\% \times 2 = 7.75\%$.

101. Yield to call--semiannual bond **Answer: d Diff: M**

Find the current bond price using the YTM:
 $N = 12 \times 2 = 24$; $I = 9/2 = 4.5$; $PMT = 100/2 = 50$; $FV = 1000$; and then solve for $PV = -\$1,072.48$. $V_B = \$1,072.48$.

Solve for the YTC:
 $N = 5 \times 2 = 10$; $PV = -1072.48$; $PMT = 50$; $FV = 1050$; $I = 4.49\% \times 2 = 8.98\%$.

102. Yield to call--semiannual bond **Answer: c Diff: M**

First calculate the bond price:
 $N = 2 \times 20 = 40$; $I/YR = 9/2 = 4.5$; $PMT = 110/2 = 55$; $FV = 1000$; and then solve for $PV = -\$1,184.02$. $V_B = \$1,184.02$.

Now, solve for the YTC:
 $N = 2 \times 10 = 20$; $PV = -1184.02$; $PMT = 55$; $FV = 1055$; and then solve for $I/YR = 4.29\% \times 2 = 8.58\%$.

103. Yield to call--semiannual bond **Answer: b Diff: M**

First we need to find the bond price:
 $N = 12 \times 2 = 24$; $I = 10/2 = 5$; $PMT = 60$; $FV = 1000$; and then solve for $PV = -\$1,137.99$. $V_B = \$1,137.99$.

Now use the bond price to figure the YTC:
 $N = 8 \times 2 = 16$; $PV = -1137.99$; $PMT = 60$; $FV = 1050$; and then solve for $I = 4.9441\% \times 2 = 9.8883\% \approx 9.89\%$.

104. Yield to call--semiannual bond **Answer: c Diff: M**

Step 1: Find the bond price today, if held to maturity:
Enter the following input data into the calculator:
 $N = 24$, $I = 7/2 = 3.5$, $PMT = 50$, $FV = 1000$, and then solve for
 $PV = -\$1,240.88$. $V_B = \$1,240.88$.

Step 2: Calculate the yield to call:
Enter the following input data into the calculator:
 $N = 10$, $PV = -1240.88$, $PMT = 50$, $FV = 1050$, and then solve for
 $I = 2.667\%$.

However, this is a six-month rate, not a one-year rate. To find the nominal yield to call, just multiply this rate by 2:
 $2.667\% \times 2 = 5.33\%$.

105. Yield to call--semiannual bond **Answer: c Diff: M**

Step 1: Find the bond price today if it is not called:
 $N = 24$; $I = 3$; $PMT = 40$; $FV = 1000$; and then solve for $PV = -\$1,169.36$. $V_B = \$1,169.36$.

Step 2: Find the yield to call:
 $N = 10$; $PV = -1169.36$; $PMT = 40$; $FV = 1040$; and then solve for
 $I = 2.43\%$.

This is the nominal rate for 6 months. The annual nominal rate is $2 \times 2.43\% = 4.86\%$.

106. Yield to call--semiannual bond **Answer: b Diff: M N**

Enter the following data as inputs in your calculator:
 $N = 2 \times 5 = 10$; $PV = -1075$; $PMT = 0.09/2 \times 1,000 = 45$; $FV = 1035$; and then solve for $I = k_d/2 = 3.8743\%$.

Since this is a 6-month rate, just multiply by 2 to solve for the nominal yield to call. $I = k_d = 2 \times 3.8743\% = 7.7486\% \approx 7.75\%$.

107. Yield to maturity **Answer: c Diff: M N**

Data given: $N = 10$; $I = ?$ (This is what the problem is looking for); $PMT = 85$; $PV = ?$ (Don't have directly, but you can calculate it from the current yield); $FV = 1,000$.

Step 1: Calculate the bond's current price from information given in the current yield.
Current yield = Coupon/Price
 $0.08 = \$85/\text{Price}$
Price = ? = $\$1,062.50$.

Step 2: Given the bond's price, calculate the bond's yield to maturity using your financial calculator by entering the following data as inputs:
 $N = 10$; $PV = -1062.50$; $PMT = 85$; $FV = 1000$; and then solve for
 $I = 7.5859\% \approx 7.59\%$.

108. Yield to maturity--semiannual bond **Answer: d Diff: M**

Step 1: First determine what the bond is selling for today based on the information given about its call feature:

$N = 10(2) = 20$; $I = 6.5/2 = 3.25$; $PMT = 100/2 = 50$; $FV = 1050$;
and then solve for $PV = -\$1,280.81$. $V_B = \$1,280.81$.

Step 2: Use this current price solution to solve for the YTM:

$N = 15(2) = 30$; $PV = -1280.81$; $PMT = 100/2 = 50$; $FV = 1000$;
and then solve for $I = 3.4775\%$.

Step 3: Since this is a semiannual rate, multiply it by 2 to solve for the nominal, annual YTM:

$YTM = 3.4775\%(2) = 6.955\% \approx 6.95\%$.

109. Yield to maturity--semiannual bond **Answer: d Diff: M**

We know the YTC, so from that we can find the current price. Once we know the current price, we can find the YTM.

Step 1: Using the YTC information solve for the bond's current price:

Enter the following input data in the calculator:

$N = 14$; $I = 3.25$; $PMT = 35$; $FV = 1040$; and then solve for $PV = -\$1,053.33$. $V_B = \$1,053.33$.

Step 2: Now use the bond's current price to find the YTM:

Enter the following input data in the calculator:

$N = 20$; $PV = -1053.33$; $PMT = 35$; $FV = 1000$; and then solve for $I = 3.137\%$.

Step 3: This rate is a semiannual rate. To find the nominal annual rate, multiply by two to get $3.137\% \times 2 = 6.274\% \approx 6.27\%$.

110. Yield to maturity--semiannual bond **Answer: d Diff: M N**

$N = 8 \times 2 = 16$; $I = ?$; $PV = ?$; $PMT = 0.095/2 \times 1,000 = 47.50$; $FV = 1,000$

Step 1: Determine the bond's current price.

Current yield = Annual interest/Current bond price

$$8.2\% = \$95.00/V_B$$

$$V_B = \$95.00/0.082$$

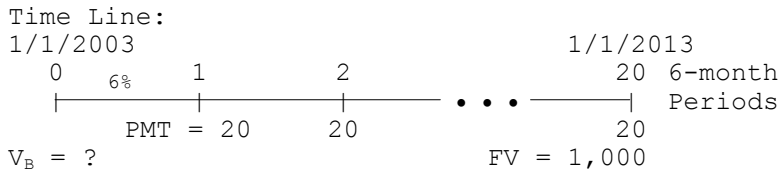
$$V_B = \$1,158.54.$$

Step 2: Determine the bond's yield to maturity.

$N = 16$; $PV = -1158.54$; $PMT = 47.50$; $FV = 1000$; $I = ?$ Solve for
 $I = k_d/2 = 3.44\%$; $k_d = 3.44\% \times 2 = 6.89\%$.

115. Market value of semiannual bonds

Answer: a Diff: M



Financial calculator solution:
 Inputs: $N = 20$; $I = 6$; $PMT = 20$; $FV = 1000$.
 Output: $PV = -\$541.20$; $V_B = \$541.20$.

Since there are 10,000 bonds outstanding the total value of debt is $\$541.20(10,000) = \$5,412,000$.

116. Future bond value--annual payment

Answer: c Diff: M

The $YTM = \text{Current yield} + \text{Capital gain}$.
 Thus: $\text{Capital gain} = YTM - \text{Current yield}$
 $= 9.7072\% - 10\% = -0.2928\%$.

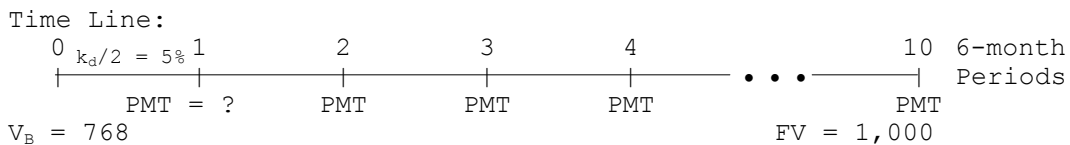
The price in 1 year = $\text{Price now} \times (1 + \text{CG}\%)$.

Price now:
 $\text{Current yield} = \text{Annual coupon}/\text{Price}$.
 Thus: $\text{Price} = \text{Annual coupon}/\text{Current yield}$
 $= \$110/0.10 = \$1,100$.

Price in one year = $\$1,100 \times (1 + \text{CG}\%)$
 $= \$1,100 \times (1 - 0.002928)$ (Remember to express the
 $= \$1,096.78 \approx \$1,097$. capital gain as a decimal.)

117. Bond coupon rate

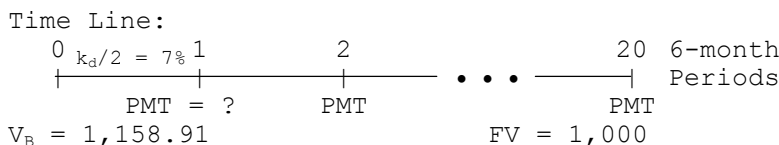
Answer: c Diff: M



Financial calculator solution:
 Inputs: $N = 10$; $I = 5$; $PV = -768$; $FV = 1000$.
 Output: $PMT = \$19.955$ (semiannual PMT).
 $\text{Annual coupon rate} = (PMT \times 2)/M = (\$19.955 \times 2)/\$1,000 = 3.99\% \approx 4\%$.

118. Bond coupon rate

Answer: d Diff: M

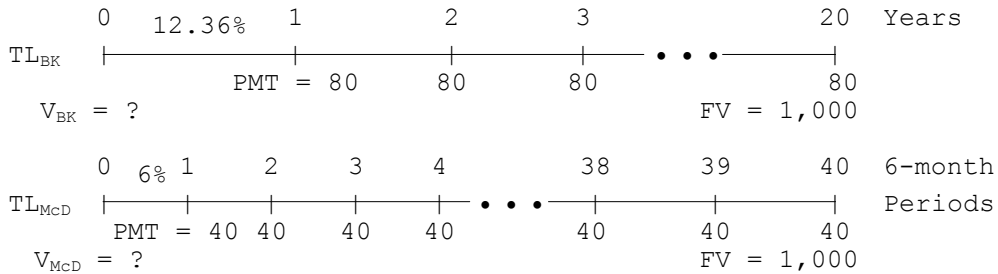


Financial calculator solution:
 Inputs: $N = 20$; $I = 7$; $PV = -1158.91$; $FV = 1000$.
 Output: $PMT = \$85.00$ (semiannual PMT).
 $\text{Annual coupon rate} = \$85(2)/\$1,000 = 17.0\%$.

119. Bond value

Answer: d Diff: T

Time Line:



Burger King V_B:

Calculate EAR to apply to Burger King bonds using interest rate conversion feature, and calculate the value, V_{BK}, of Burger King bonds: Inputs: P/YR = 2; NOM% = 12. Output: EFF% = EAR = 12.36%. (Remember to switch P/YR back to 1.)

Inputs: N = 20; I = 12.36; PMT = 80; FV = 1000.

Output: PV = -\$681.54. V_B = \$681.54.

McDonalds V_B:

Inputs: N = 40; I = 6; PMT = 40; FV = 1000.

Output: PV = -\$699.07. V_B = \$699.07.

Calculate the difference between the two bonds' PVs:

Difference: V_{B(McD)} - V_{B(BK)} = \$699.07 - \$681.54 = \$17.53.

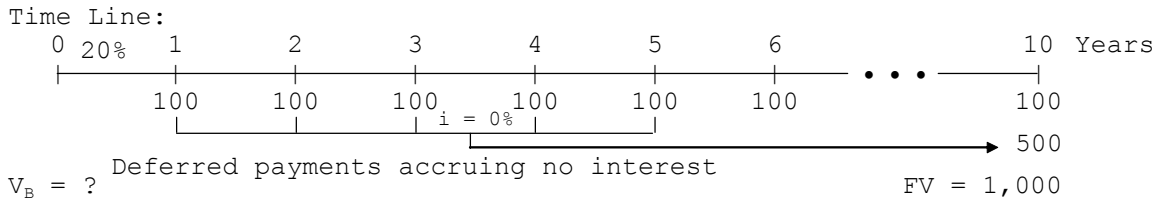
120. Bond value and effective annual rate

Answer: b Diff: T

Since the securities are of equal risk, they must have the same effective rate. Since the comparable 10-year bond is selling at par, its nominal yield is 8 percent, the same as its coupon rate. Because it is a semiannual coupon bond, its effective rate is 8.16 percent. Using your calculator, enter NOM% = 8; P/YR = 2; and solve for EFF%. (Remember to change back to P/YR = 1.) So, since the bond you are considering purchasing has quarterly payments, its nominal rate is calculated as follows: EFF% = 8.16; P/YR = 4; and solve for NOM%. NOM% = 7.9216%. (Again, remember to change back to P/YR = 1.) To determine the quarterly payment bond's price you must use the cash flow register because the payment amount changes. CF₀ = 0, CF₁ = 20; N_j = 20; CF₂ = 25; N_j = 19; CF₃ = 1025; I = 7.9216/4 = 1.9804; and then solve for NPV = \$1,060.72.

121. Bond value after reorganization

Answer: d Diff: T



Financial calculator solution:

Inputs: $CF_0 = 0$; $CF_1 = 0$; $N_j = 5$; $CF_2 = 100$; $N_j = 4$; $CF_5 = 1600$; $I = 20$.

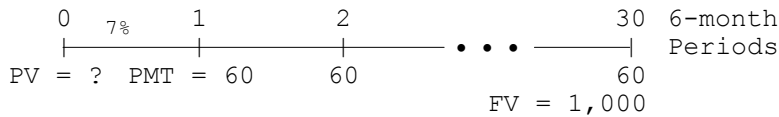
Output: NPV = \$362.44. $V_B = \$362.44$.

122. Bond sinking fund payment

Answer: d Diff: T

The company must call 5 percent or \$50,000 face value each year. It could call at par and spend \$50,000 or buy on the open market. Since the interest rate is higher than the coupon rate (14% vs. 12%), the bonds will sell at a discount, so open market purchases should be used.

Time Line:



Financial calculator solution:

Inputs: $N = 30$; $I = 7$; $PMT = 60$; $FV = 1000$.

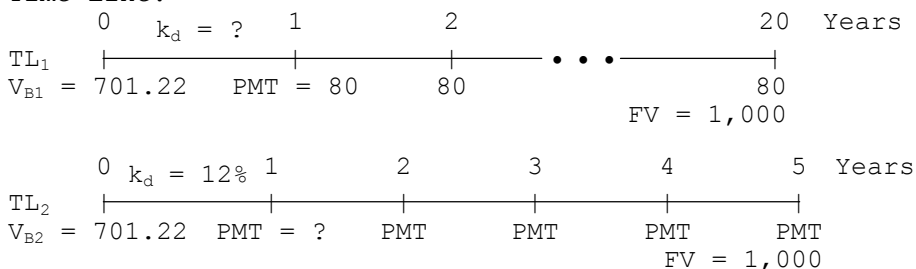
Output: $PV = -\$875.91$. $V_B = \$875.91$.

The company would have to buy $\$50,000/\$1,000 = 50$ bonds at \$875.91 each = \$43,795.50 \approx \$43,796.

123. Bond coupon payment

Answer: b Diff: T

Time Line:



Calculate YTM or k_d for first issue:

Inputs: $N = 20$; $PV = -701.22$; $PMT = 80$; $FV = 1000$.

Output: $I = k_d = YTM = 12\%$.

Calculate PMT on second issue using $12\% = k_d = YTM$:

Inputs: $N = 5$; $I = 12$; $PV = -701.22$; $FV = 1000$.

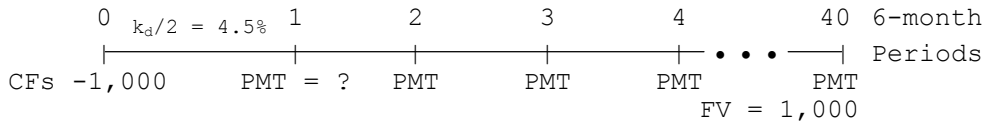
Output: $PMT = \$37.116 \approx \37.12 .

124. Bonds with differential payments

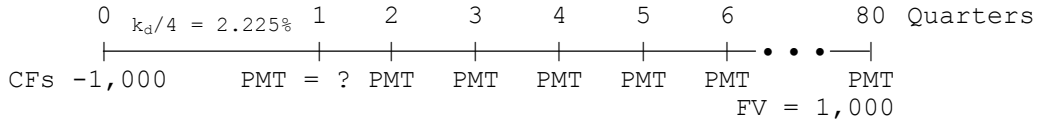
Answer: c Diff: T

Time Line:

Semiannual



Quarterly



Step 1: Calculate the EAR of 9% nominal yield bond compounded semi-annually. Use interest rate conversion feature.

Inputs: P/YR = 2; NOM% = 9. Output: EFF% = 9.2025%.
 (Remember to change back to P/YR = 1.)

Step 2: Calculate the nominal rate, k_{Nom} , of a 9.2025% EAR but with quarterly compounding.

Inputs: P/YR = 4; EFF% = 9.2025. Output: NOM% = 8.90%.
 (Remember to change back to P/YR = 1.)

Step 3: Calculate the quarterly periodic rate from k_{Nom} of 8.9% and calculate the quarterly payment.

$k_{PER} = k_{Nom}/4 = 8.90\%/4 = 2.225\%$.
 Inputs: N = 80; I = 2.225; PV = -1000; FV = 1000.
 Output: PMT = \$22.25.

125. Current yield--annual bond

Answer: a Diff: E N

Current yield = Annual interest/Current bond price

Current yield = \$80/\$925

Current yield = 8.65%.

126. Yield to maturity--annual bond

Answer: c Diff: M N

Enter the following data as inputs in your calculator as follows:

N = 10; PV = -925; PMT = 80; FV = 1000; I = ? Solve for I = k_d = YTM = 9.18%.

127 Future bond value--annual payment

Answer: e Diff: M N

Enter the following data as inputs in your calculator as follows:

N = 7; I = 9.18; PMT = 80; FV = 1000; PV = ? Solve for PV = -\$940.97.

$V_B = \approx \$941.00$.

128. Bond value--annual payment

Answer: d Diff: E N

Enter the following data as inputs in your calculator:

N = 12; I = 7; PMT = $0.08 \times 1,000 = 80$; FV = 1000; and then solve for PV = -\$1,079.43. $V_B = \$1,079.43$.

129. Future bond value--annual payment **Answer: e Diff: E N**

3 years have passed so N now is $12 - 3 = 9$.
 $N = 9$; $I = 7$; $PMT = 0.08 \times 1,000 = 80$; $FV = 1000$; and then solve for PV
 $= -\$1,065.15$. $V_B = \$1,065.15$.

130. Yield to maturity--semiannual bond **Answer: d Diff: E N**

Input the following data in your calculator: $N = 30$; $PV = -1190$; $PMT = 50$;
 $FV = 1000$; and then solve for $I = 3.9128\%$, but this interest rate is on a
semiannual basis. The nominal YTM is $3.9128\% \times 2 = 7.8257\% \approx 7.83\%$.

131. Yield to call--semiannual bond **Answer: a Diff: E N**

Input the following data in your calculator: $N = 10$; $PV = -1190$; $PMT = 50$;
 $FV = 1050$; and then solve for $I = 3.1841\%$, but this interest rate is on a
semiannual basis. The nominal YTC is $3.1841\% \times 2 = 6.3682\% \approx 6.37\%$.

132. Yield to maturity--annual bond **Answer: a Diff: E N**

Enter the following data as inputs in the financial calculator:
 $N = 12$; $PV = -1025$; $PMT = 80$; $FV = 1000$; and then solve for $I = YTM =$
 $7.6738\% \approx 7.67\%$.

133. Price risk--annual bond **Answer: e Diff: M N**

Old YTM = 7.6738% . New YTM = $7.6738\% - 1\% = 6.6738\%$.

Using the new YTM, first solve for the new bond price by entering the
following data in your financial calculator:

$N = 12$; $I = YTM = 6.6738$; $PMT = 80$; $FV = 1000$; and then solve for $PV =$
 $-\$1,107.19$. $V_B = \$1,107.19$.

Now, you can calculate the change in price: $\frac{\$1,107.19 - \$1,025.00}{\$1,025.00} = 8.02\% \approx 8\%$.

7A-4. Zero coupon bond**Answer: b Diff: E**

Step 1: Find out what was paid for the bond:

$$PV = \$1,000 / (1.068)^7 = \$630.959.$$

Step 2: Determine the Year 1 accrued interest:

$$\text{The accrued interest in the first year is } \$630.959 \times 0.068 = \$42.905.$$

Step 3: Calculate the tax on the accrued interest:

$$\text{Tax on the accrued interest is } \$42.905 \times 0.3 = \$12.87.$$

7A-5. Zero coupon bond**Answer: d Diff: M**

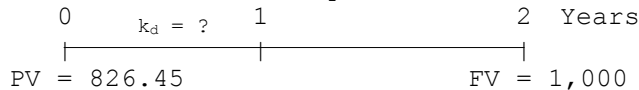
First, find the value of the bond today as follows: $N = 12$; $I = 9$; $PMT = 0$; $FV = 1000$; and then solve for $PV = -\$355.53$. $V_B = \$355.53$.

Second, find the value of the bond at the end of the first year as follows: $N = 11$; $I = 9$; $PMT = 0$; $FV = 1000$; and then solve for $PV = -\$387.53$. $V_{B1} = \$387.53$.

The taxable income on the bond is the appreciation in value over the year or $\$387.53 - \$355.53 = \$32$. Thus, the tax paid is $25\% \times \$32 = \8 .

7A-6. Zero coupon bond**Answer: b Diff: M**

Time Line: Zero coupon bond



First, find the value of k_d as the interest rate that will cause \$826.45 to grow to \$1,000 in 2 years.

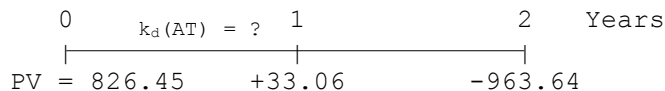
Inputs: $N = 2$; $PV = -826.45$; $PMT = 0$; $FV = 1000$. Output: $I = k_d = 10\%$.

$$k_d(\text{After-tax}) = k_d(1 - T) = 0.10(0.6) = 0.06 = 6\%.$$

Analysis of cash flows method using calculated $k_d = 10\%$ and financial calculator:

	Year		
	0	1	2
Accrued value	\$826.45	\$909.10	\$1,000.00
Interest $((V_t \times 1.10) - V_t)$		82.65	90.90
Tax savings $(\text{Interest} \times 0.40)$		33.06	36.36
Cash flows	+826.45	+33.06	+36.36
			-1,000.00
			-\$ 963.64

Time line:



Financial calculator solution: (Using CFs from worksheet analysis)

Inputs: $CF_0 = 826.45$; $CF_1 = 33.06$; $CF_2 = -963.64$. Output: $IRR\% = 6.0\%$.

$$k_d(\text{AT}) = 6.0\%.$$

7A-7. Zero coupon bond

Answer: a Diff: M

Step 1: Find PV of bond:

$N = 15; I = 8; PMT = 0; FV = 1000;$ and then solve for $PV = -\$315.24.$
 $V_B = \$315.24.$

Step 2: Find interest for the first year:

Value at t=0	\$315.24
Interest rate	$\times 0.08$
Interest income	<u>\$ 25.22</u>

Step 3: Find tax due:

Interest income	\$25.22
Tax rate	$\times 0.30$
Tax due	<u>\$ 7.57</u>

7A-8. Zero coupon bond

Answer: d Diff: M

Step 1: Find the price of the bond today:

$N = 7; I = 6; PMT = 0; FV = 1000;$ and then solve for $PV = -\$665.0571.$ $V_B = \$665.0571.$

Step 2: Find the price of the bond in 1 year:

$N = 6; I = 6; PMT = 0; FV = 1000;$ and then solve for $PV = -\$704.9605.$ $V_B = \$704.9605.$

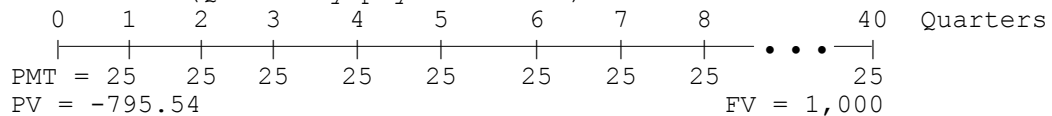
Step 3: Calculate the taxes due on the gain:

The difference is $\$704.9605 - \$665.0571 = \$39.9034.$
 The taxes due are $0.25 \times \$39.9034 = \$9.9759 \approx \$9.98.$

7A-9. Zero coupon bond and EAR

Answer: d Diff: M

Time line: (Quarterly payment bonds)



Calculate nominal periodic and annual interest rates:

Inputs: $N = 40; PV = -795.54; PMT = 25; FV = 1000.$

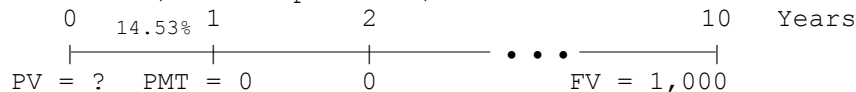
Output: $I = k_d/4 = 3.45\%$ per period.

$k_{Nom} = 4 \times 3.45\% = 13.80\%.$

Calculate EAR using interest rate conversion feature:

Inputs: $P/YR = 4; NOM\% = 13.80.$ Output: $EFF\% = 14.53\%.$ (Remember to change back to $P/YR = 1.$)

Time line: (Zero coupon bond)



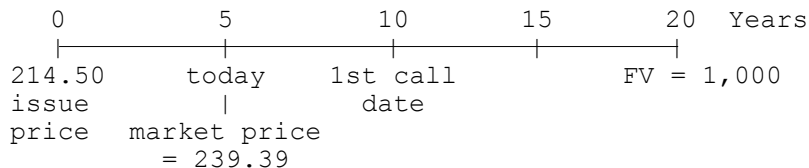
Calculate PV of zero coupon bond using EAR:

Inputs: $N = 10; I = 14.53; PMT = 0; FV = 1000.$

Output: $PV = -\$257.518 \approx -\$257.52.$ $V_B = \$257.52.$

7A-10. Callable zero coupon bond**Answer: c Diff: M**

Time Line:



Financial calculator solution:

Inputs: $N = 20$; $PV = -214.50$; $PMT = 0$; $FV = 1000$. Output: $I = 8.0\%$.
The bonds were issued at 8%.

Inputs: $N = 15$; $PV = -239.39$; $PMT = 0$; $FV = 1000$. Output: $I = 10.0\%$.
At a current market price of \$239.39, market rates are 10.0%. Thus, the bond will not likely be called, so today at Year 5, YTM of 10% is the most likely annual rate an investor will earn.

7A-11. Zero coupon bond and taxes**Answer: a Diff: M**

You need to figure out how much you would pay for the bond today, and what its price will be next year to find the capital gain.

Step 1: Determine the price of the zero coupon bond today:

Enter the following input data into the calculator:

$N = 7$; $I = 6$; $PMT = 0$; $FV = 1000$; and then solve for $PV = -\$665.0571$. $V_B = \$665.0571$.

Step 2: Determine the price of the zero coupon bond one year later:

Enter the following input data into the calculator:

$N = 6$; $I = 6$; $PMT = 0$; $FV = 1000$; and then solve for $PV = -\$704.9605$. $V_{B1} = \$704.9605$.

Step 3: Determine the taxes due on the gain:

The difference between the two prices is the capital gain:

Capital gain = $\$704.9605 - \$665.0571 = \$39.90$.

This gain is taxed at the rate of 30%:

Taxes = $0.3 \times \$39.90 = \11.97 .

7A-12. Taxes on zero coupon bond**Answer: e Diff: M N**

Step 1: Determine the price of the bond today:

$N = 15$; $I = 7$; $PMT = 0$; $FV = 1000$; and then solve for $PV = -\$362.446$. $V_B = \$362.446$.

Step 2: Determine the price of the bond one year from now:

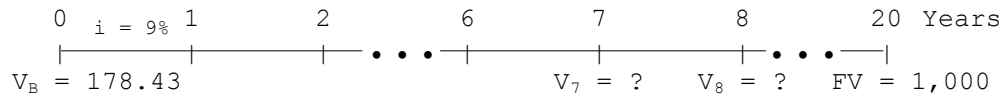
$N = 14$; $I = 7$; $PMT = 0$; $FV = 1000$; and then solve for $PV = -\$387.817$. $V_{B1} = \$387.817$.

Step 3: Determine the capital gain on the bond:

Capital gain = $\$387.817 - \$362.446 = \$25.371$.

Step 4: Calculate the first year's taxes:

Taxes due = $\$25.371 \times 0.25 = \6.34 .

7A-13. Accrued value and interest expense**Answer: a Diff: M**

Financial calculator solution:

Inputs: N = 8; I = 9; PV = -178.43; PMT = 0. Output: FV = \$355.53 = V₈.Inputs: N = 7; I = 9; PV = -178.43; PMT = 0. Output: FV = \$326.18 = V₇.

Difference: \$355.53 - \$326.18 = \$29.35.

Solution check: \$29.35/\$326.18 = 9.0%.

7A-14. Zeros and expectations theory**Answer: d Diff: T**

First find the yields on one-year and two-year zero-coupon bonds, so you can find the implied rate on a one-year bond, one year from now. Then use this implied rate to find its price.

1-Year:

N = 1; PV = -938.9671; PMT = 0; FV = 1000; and then solve for I = 6.5%.

2-Year:

N = 2; PV = -873.4387; PMT = 0; FV = 1000; and then solve for I = 7.0%.

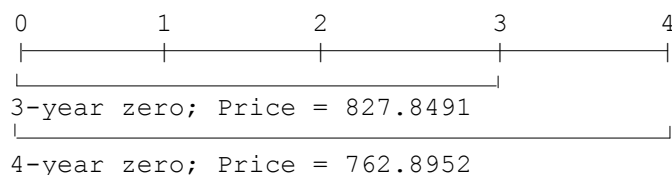
Therefore, if the implied rate = X

$$\frac{6.5\% + X}{2} = 7.0\%$$

$$X = 7.5\%.$$

Now find the price of a 1-year zero, 1 year from now:

N = 1; I = 7.5; PMT = 0; FV = 1000; and then solve for PV = -\$930.23.

V_{B1} = \$930.23.**7A-15. Zeros and expectations theory****Answer: a Diff: T**

Step 1: Calculate the YTM for the 3-year zero:

N = 3; PV = -827.8491; PMT = 0; FV = 1000; then solve for I = 6.5%.

Step 2: Calculate the YTM for the 4-year zero:

N = 4; PV = -762.8952; PMT = 0; FV = 1000; then solve for I = 7%.

Step 3: Calculate the interest rate on a 1-year zero, 3 years from now:

$$7\% = \frac{6.5\%(3) + X}{4}$$

$$X = 8.5\%.$$

Step 4: Calculate the price of a 1-year zero 3 years from now:

N = 1; I = 8.5; PMT = 0; FV = 1000; and then solve for PV = -\$921.66. V_B = \$921.66.

7A-16. Zero coupon bond

Answer: d Diff: T

	0	2	4	6	8	10
	----- i = 4% ----- ----- ----- ----- -----					
Accrued value	140.71	152.19	164.61	178.04	192.57	208.29
Call value						216.62

- Step 1: Calculate PV of zero coupon bond at Time 0:
 $N = 50; I = 4; PMT = 0; FV = 1000;$ and then solve for $PV = -\$140.71.$ $V_B = \$140.71.$
- Step 2: Calculate accrued value at Year 5:
 $\$140.71(1.04)^{2(5)} = \$208.29.$
- Step 3: Call value at Year 5:
 $\$208.29(1.04) = \$216.62.$
- Step 4: Calculate EAR as follows:
 $N = 10; PV = -140.71; PMT = 0; FV = 216.62;$ and then solve for $I = 4.41%;$ however, this is a semiannual rate.
 $EAR = (1.0441)^2 - 1 = 9.01%.$

7A-17. Zero coupon bond

Answer: e Diff: T

Time Line:

0	10	...	50	6-month
----- ----- ----- ----- -----				
PV = ? = 87.20	PV ₅ = 142.05		FV = 1,000	Periods
	+ Premium 14.20			
	156.25			
	YTC = ?			

- Financial calculator solution:
- Step 1: Determine EAR for discounting. Using interest rate conversion feature:
 Inputs: $P/YR = 2; NOM\% = 10\%.$ Output: $EFF\% = 10.25\%.$
 Formula method: $EAR = \left(1 + \frac{k}{2}\right)^2 - 1 = (1.05)^2 - 1 = 0.1025.$
- Step 2: Determine price of bond when issued.
 Inputs: $N = 25; I = 10.25; PMT = 0; FV = 1000.$ Output: $PV = -\$87.20.$ $V_B = \$87.20.$
- Step 3: Determine accrued value of bond today, and calculate call price.
 Inputs: $N = 5; I = 10.25; PV = -87.20; PMT = 0.$
 Output: $FV = \$142.04.$ Premium is 10% over accrued value.
 Call price = $\$142.04 \times 1.10 = \$156.24.$
- Step 4: Determine the periodic rate (semiannual compounding).
 Inputs: $N = 10; PV = -87.20; PMT = 0; FV = 156.24.$
 Output: $I = 6.005\%.$
 Nominal annual rate = $2 \times 6.005\% = 12.01\%.$
- Step 5: Determine effective annual rate earned on bond using interest rate conversion feature:
 Inputs: $P/YR = 2; NOM\% = 12.01.$ Output: $EFF\% = 12.37\%.$

7A-18. Taxes on zero coupon bond

Answer: a Diff: T

Since zero coupon bonds do not make annual interest payments, the tax deduction is determined by the accumulated (but unpaid) interest on the bond over the year. To determine this we will calculate the value of the bond at $t = 1$ and at $t = 2$.

$$t = 1: N = 9; I/YR = 9.5; PMT = 0; FV = 1000; PV = -\$441.85. \quad V_{B1} = \$441.85.$$

$$t = 2: N = 8; I/YR = 9.5; PMT = 0; FV = 1000; PV = -\$483.82. \quad V_{B2} = \$483.82.$$

So the accumulated interest is: $\$483.82 - \$441.85 = \$41.97$.

$$\text{Tax savings} = 30\%(\$41.97) = \$12.59.$$

7A-19. Zero coupon interest tax shield

Answer: b Diff: T

Time Line:

	0	1	2	3	Years

PV = +727.25	PMT = 0	0	0	0	
	Tax savings ₁	Tax savings ₂	Tax savings ₃	FV = 1,000	

Financial calculator solution:

Inputs: $N = 3; PV = 727.25; PMT = 0; FV = -1000$. Output: $I = 11.20\%$.

	0	1	2	3
1) Accrued value	727.25	808.70	899.28	1,000.00
2) Interest expense		81.45	90.58	100.72
3) Tax savings (line 2 \times 0.40)		32.58	36.23	40.29
				+40.29
				-1,000.00
4) Cash flows	+727.25	+32.58	+36.23	-959.71

7A-20. After-tax cost of debt

Answer: c Diff: M

Financial calculator solution:

Solve for the YTM using the information from the previous question

Inputs: $N = 3; PV = 727.25; PMT = 0; FV = -1000$.

Output: $I = 11.20$. Before-tax cost debt of this issue = 11.20%.

$$k_d(\text{After-tax}) = 11.20\%(1 - T) = 11.2\%(0.6) = 6.72\%.$$

Alternate solution using cash flows:

Inputs: $CF_0 = 727.25; CF_1 = 32.58; CF_2 = 36.23; CF_3 = -959.71$.

Output: $IRR\% = 6.72\%$.

WEB APPENDIX 7B SOLUTIONS

7B-1. Liquidation procedures

Answer: e Diff: M

7B-2. Bankruptcy law

Answer: d Diff: M

7B-3. Bankruptcy issues

Answer: e Diff: M

7B-4. Priority of claims

Answer: c Diff: T