Chapter 08
Interest Rates and Bond Valuation

Multiple Choice Questions

1. A bond that makes no coupon payments and is initially priced at a deep discount is called a _____ bond.
A. Treasury
B. municipal
C. floating-rate
D. junk
E. zero coupon

2. An asset characterized by cash flows that increase at a constant rate forever is called a:
A. growing perpetuity.
B. growing annuity.
C. common annuity.
D. perpetuity due.
E. preferred stock.

3. The stated interest payment, in dollars, made on a bond each period is called the bond's:
A. coupon.
B. face value.
C. maturity.
D. yield to maturity.
E. coupon rate.

4. The principal amount of a bond that is repaid at the end of the loan term is called the bond's:
A. coupon.
B. face value.
C. maturity.
D. yield to maturity.
E. coupon rate.

5. The specified date on which the principal amount of a bond is repaid is called the bond's:
A. coupon.
B. face value.
C. maturity.
D. yield to maturity.
E. coupon rate.

6. The rate of return required by investors in the market for owning a bond is called the:
A. coupon.
B. face value.
C. maturity.
D. yield to maturity.
E. coupon rate.

7. The annual coupon of a bond divided by its face value is called the bond's:
A. coupon.
B. face value.
C. maturity.
D. yield to maturity.
E. coupon rate.

8. A bond with a face value of $1,000 that sells for $1,000 in the market is called a _____ bond.
A. par value
B. discount
C. premium
D. zero coupon
E. floating rate

9. A bond with a face value of $1,000 that sells for less than $1,000 in the market is called a _____ bond.
A. par
B. discount
C. premium
D. zero coupon
E. floating rate

10. The relationship between nominal rates, real rates, and inflation is known as the:
A. Miller and Modigliani theorem.
B. Fisher effect.
C. Gordon growth model.
D. term structure of interest rates.
E. interest rate risk premium.

11. The relationship between nominal interest rates on default-free, pure discount securities and the time to maturity is called the:
A. liquidity effect.
B. Fisher effect.
C. term structure of interest rates.
D. inflation premium.
E. interest rate risk premium.

12. The _____ premium is that portion of a nominal interest rate or bond yield that represents compensation for expected future overall price appreciation.
A. default risk
B. taxability
C. liquidity
D. inflation
E. interest rate risk

13. A bond with a 7% coupon that pays interest semi-annually and is priced at par will have a market price of _____ and interest payments in the amount of _____ each.
A. $1,007; $70
B. $1,070; $35
C. $1,070; $70
D. $1,000; $35
E. $1,000; $70

14. All else constant, a bond will sell at _____ when the yield to maturity is _____ the coupon rate.
A. a premium; higher than
B. a premium; equal to
C. at par; higher than
D. at par; less than
E. a discount; higher than

15. All else constant, a coupon bond that is selling at a premium, must have:
A. a coupon rate that is equal to the yield to maturity.
B. a market price that is less than par value.
C. semi-annual interest payments.
D. a yield to maturity that is less than the coupon rate.
E. a coupon rate that is less than the yield to maturity.

16. The market price of a bond is equal to the present value of the:
A. face value minus the present value of the annuity payments.
B. annuity payments plus the future value of the face amount.
C. face value plus the present value of the annuity payments.
D. face value plus the future value of the annuity payments.
E. annuity payments minus the face value of the bond.

17. American Fortunes is preparing a bond offering with an 8% coupon rate. The bonds will be repaid in 10 years. The company plans to issue the bonds at par value and pay interest semiannually. Given this, which of the following statements are correct?
I. The initial selling price of each bond will be $1,000.
II. After the bonds have been outstanding for 1 year, you should use 9 as the number of compounding periods when calculating the market value of the bond.
III. Each interest payment per bond will be $40.
IV. The yield to maturity when the bonds are first issued is 8%.
A. I and II only
B. II and III only
C. II, III, and IV only
D. I, II, and III only
E. I, III, and IV only

18. The newly issued bonds of the Wynslow Corp. offer a 6% coupon with semiannual interest payments. The bonds are currently priced at par value. The effective annual rate provided by these bonds must be:
A. equal to 3%.
B. greater than 3% but less than 4%.
C. equal to 6%.
D. greater than 6% but less than 7%.
E. equal to 12%.

19. You own a bond that has a 7% coupon and matures in 12 years. You purchased this bond at par value when it was originally issued. If the current market rate for this type and quality of bond is 7.5%, then you would expect:
A. the bond issuer to increase the amount of each interest payment on these bonds.
B. the yield to maturity to remain constant due to the fixed coupon rate.
C. to realize a capital loss if you sold the bond at the market price today.
D. today's market price to exceed the face value of the bond.
E. the current yield today to be less than 7%.

20. A bond with semi-annual interest payments, all else equal, would be priced _____ than one with annual interest payments.
A. higher
B. lower
C. the same
D. it is impossible to tell
E. either higher or the same

21. A zero coupon bond:
A. is sold at a large premium.
B. has a price equal to the future value of the face amount given a specified rate of return.
C. can only be issued by the U.S. Treasury.
D. has less interest rate risk than a comparable coupon bond.
E. has implicit interest which is calculated by amortizing the loan.

22. The total interest paid on a zero-coupon bond is equal to:
A. zero.
B. the face value minus the issue price.
C. the face value minus the market price on the maturity date.
D. $1,000 minus the face value.
E. $1,000 minus the par value.

23. The yield to maturity is:
A. the rate that equates the price of the bond with the discounted cash flows.
B. the expected rate to be earned if held to maturity.
C. the rate that is used to determine the market price of the bond.
D. equal to the current yield for bonds priced at par.
E. All of the above.

24. Face value is:
A. always higher than current price.
B. always lower than current price.
C. the same as the current price.
D. the coupon amount.
E. None of the above.

25. One basis point is equal to:
A. .01%.
B. .10%.
C. 1.0%.
D. 10%.
E. 100%.

26. The "EST SPREAD" shown in *The Wall Street Journal* listing of corporate bonds represents the estimated:
A. yield to maturity.
B. difference between the current yield and the yield to maturity.
C. difference between the bond's yield and the yield of a particular Treasury issue.
D. range of yields to maturity provided by the bond over its life to date.
E. difference between the yield to call and the yield to maturity.

27. A bond is listed in The Wall Street Journal as a 12 3/4s of July 2009. This bond pays:
A. $127.50 in July and January.
B. $63.75 in July and January.
C. $127.50 in July.
D. $63.75 in July.
E. None of the above.

28. If its yield to maturity is less than its coupon rate, a bond will sell at a _____, and increases in market interest rates will _____.
A. discount; decrease this discount.
B. discount; increase this discount.
C. premium; decrease this premium.
D. premium; increase this premium.
E. None of the above.

29. The Fisher formula is expressed as _____ where R is the nominal rate, r is the real rate, and h is the inflation rate.
A. $1 + r = (1 + R) \div (1 + h)$
B. $1 + r = (1 + R) \times (1 + h)$
C. $1 + h = (1 + r) \div (1 + R)$
D. $1 + R = (1 + r) \div (1 + h)$
E. $1 + R = (1 + r) \times (1 + h)$

30. The Fisher Effect primarily emphasizes the effects of _____ risk on an investor's rate of return.
A. default
B. market
C. interest rate
D. inflation
E. maturity

31. Consider a bond which pays 7% semiannually and has 8 years to maturity. The market requires an interest rate of 8% on bonds of this risk. What is this bond's price?
A. $942.50
B. $911.52
C. $941.74
D. $1,064.81
E. None of the above

32. The value of a 20 year zero-coupon bond when the market required rate of return is 9% (semiannual) is ____.
A. $171.93
B. $178.43
C. $318.38
D. $414.64
E. None of the above

33. The bonds issued by Jensen & Son bear a 6% coupon, payable semiannually. The bond matures in 8 years and has a $1,000 face value. Currently, the bond sells at par. What is the yield to maturity?
A. 5.87%
B. 5.97%
C. 6.00%
D. 6.09%
E. 6.17%

34. A General Co. bond has an 8% coupon and pays interest annually. The face value is $1,000 and the current market price is $1,020.50. The bond matures in 20 years. What is the yield to maturity?
A. 7.79%
B. 7.82%
C. 8.00%
D. 8.04%
E. 8.12%

35. Winston Enterprises has a 15-year bond issue outstanding that pays a 9% coupon. The bond is currently priced at $894.60 and has a par value of $1,000. Interest is paid semiannually. What is the yield to maturity?
A. 8.67%
B. 10.13%
C. 10.16%
D. 10.40%
E. 10.45%

36. Wine and Roses, Inc. offers a 7% coupon bond with semiannual payments and a yield to maturity of 7.73%. The bonds mature in 9 years. What is the market price of a $1,000 face value bond?
A. $953.28
B. $963.88
C. $1,108.16
D. $1,401.26
E. $1,401.86

37. Party Time, Inc. has a 6% coupon bond that matures in 11 years. The bond pays interest semiannually. What is the market price of a $1,000 face value bond if the yield to maturity is 12.9%?
A. $434.59
B. $580.86
C. $600.34
D. $605.92
E. $947.87

38. Gugenheim, Inc. offers a 7% coupon bond with annual payments. The yield to maturity is 5.85% and the maturity date is 9 years. What is the market price of a $1,000 face value bond?
A. $742.66
B. $868.67
C. $869.67
D. $1,078.73
E. $1,079.59

39. The Lo Sun Corporation offers a 6% bond with a current market price of $875.05. The yield to maturity is 7.34%. The face value is $1,000. Interest is paid semiannually. How many years is it until this bond matures?
A. 16 years
B. 18 years
C. 24 years
D. 30 years
E. 32 years

40. High Noon Sun, Inc. has a 5%, semiannual coupon bond with a current market price of $988.52. The bond has a par value of $1,000 and a yield to maturity of 5.29%. How many years is it until this bond matures?
A. 4.0 years
B. 4.5 years
C. 6.5 years
D. 8.0 years
E. 9.0 years

41. Your firm offers a 10-year, zero coupon bond. The yield to maturity is 8.8%. What is the current market price of a $1,000 face value bond?
A. $430.24
B. $473.26
C. $835.56
D. $919.12
E. $1,088.00

42. Ted's Co. offers a zero coupon bond with an 11.3% yield to maturity. The bond matures in 16 years. What is the current price of a $1,000 face value bond?
A. $178.78
B. $180.33
C. $188.36
D. $190.09
E. $192.18

43. The zero coupon bonds of Markco, Inc. have a market price of $394.47, a face value of $1,000, and a yield to maturity of 6.87%. How many years is it until this bond matures?
A. 7 years
B. 10 years
C. 14 years
D. 18 years
E. 21 years

44. A 12-year, 5% coupon bond pays interest annually. The bond has a face value of $1,000. What is the change in the price of this bond if the market yield rises to 6% from the current yield of 4.5%?
A. 11.11% decrease
B. 12.38% decrease
C. 12.38% increase
D. 14.13% decrease
E. 14.13% increase

45. Jackson Central has a 6-year, 8% annual coupon bond with a $1,000 par value. Earls Enterprises has a 12-year, 8% annual coupon bond with a $1,000 par value. Both bonds currently have a yield to maturity of 6%. Which of the following statements are correct if the market yield increases to 7%?
A. Both bonds would decrease in value by 4.61%.
B. The Earls bond will increase in value by $88.25.
C. The Jackson bond will increase in value by 4.61%.
D. The Earls bond will decrease in value by 7.56%.
E. The Earls bond will decrease in value by $50.68.

46. A corporate bond is quoted at a current price of 102.767. What is the market price of a bond with a $1,000 face value?
A. $1,000.28
B. $1,002.77
C. $1,027.67
D. $1,102.77
E. $1,276.70

47. A zero coupon bond with a face value of $1,000 is issued with an initial price of $463.34. The bond matures in 25 years. What is the implicit interest, in dollars, for the first year of the bond's life?
A. $9.08
B. $12.56
C. $14.48
D. $21.47
E. $31.25

48. The MerryWeather Firm wants to raise $10 million to expand its business. To accomplish this, it plans to sell 30-year, $1,000 face value zero-coupon bonds. The bonds will be priced to yield 6%. What is the minimum number of bonds it must sell to raise the $10 million it needs?
A. 47,411
B. 52,667
C. 57,435
D. 60,000
E. 117,435

49. Which of the following amounts is closest to the value of a bond that pays $55 semiannually and has an effective semiannual interest rate of 5%? The face value is $1,000 and the bond matures in 3 years. There are exactly six months before the first interest payment.
A. $888
B. $1,000
C. $1,014
D. $1,025
E. $1,055

50. Zeta Corporation has issued a $1,000 face value zero-coupon bond. Which of the following values is closest to the correct price for the bond if the appropriate discount rate is 4% and the bond matures in 8 years?
A. $730.69
B. $968.00
C. $1,000.00
D. $1,032.00
E. This problem cannot be worked without the annual interest payments provided

51. A corporate bond with a face value of $1,000 matures in 4 years and has an 8% coupon paid at the end of each year. The current price of the bond is $932. What is the yield to maturity for this bond?
A. 5.05%
B. 6.48%
C. 8.58%
D. 10.15%
E. 11.92%

52. A bond that pays interest annually yields a 7.25% rate of return. The inflation rate for the same period is 3.5%. What is the real rate of return on this bond?
A. 3.50%
B. 3.57%
C. 3.62%
D. 3.72%
E. 3.75%

53. The bonds of Frank's Welding, Inc. pay an 8% coupon, have a 7.98% yield to maturity and have a face value of $1,000. The current rate of inflation is 2.5%. What is the real rate of return on these bonds?
A. 5.32%
B. 5.35%
C. 5.37%
D. 5.42%
E. 5.48%

54. The outstanding bonds of Roy Thomas, Inc. provide a real rate of return of 3.6%. The current rate of inflation is 2.5%. What is the nominal rate of return on these bonds?
A. 6.10%
B. 6.13%
C. 6.16%
D. 6.19%
E. 6.22%

55. The nominal rate of return on the bonds of Stu's Boats is 8.75%. The real rate of return is 3.4%. What is the rate of inflation?
A. 5.17%
B. 5.28%
C. 5.35%
D. 5.43%
E. 5.49%

Essay Questions

56. Calculate the YTM on a bond priced at $1,036 which has 2 years to maturity, a 10% annual coupon rate, and a return of $1,000 at maturity.

57. Given the opportunity to invest in one of the three bonds listed below, which would you purchase? Assume an interest rate of 7%.

Bond	Face Value	Annual Coupon Rate	Maturity	Price
A	$1,000	4%	1 year	$990
B	$1,000	7.5%	17 years	$990
C	$1,000	8.5%	25 years	$990

58. Explain why some bond investors are subject to liquidity risk, default risk, and/or taxability risk. How does each of these risks affect the yield of a bond?

59. Define what is meant by interest rate risk. Assume you are the manager of a $100 million portfolio of corporate bonds and you believe interest rates will fall. What adjustments should you make to your portfolio based on your beliefs?

60. Why do corporations issue 100-year bonds, knowing that interest rate risk is highest for very long-term bonds? How does the interest rate risk affect the issuer?

61. In the early 1980s, the Treasury yield curve had a severe downward slope with short-term yields near 20% and long-term yields below 15%. Explain how such a pattern might occur.

62. Interest rate risk is often explained by using the concept of a teeter-totter. Explain interest rate risk and how it is related to the movements of a teeter-totter.

63. The discussion of asset pricing in the text suggests that an investor will be indifferent between two bonds which have equal yields to maturity as long as they have equivalent default risk. Can you think of any real-world factors which might make a given investor prefer one of these bonds over the other?

64. Sometimes it is not clear if a particular security is debt or equity. Explain the basic difference between debt and equity.

Chapter 08 Interest Rates and Bond Valuation Answer Key

Multiple Choice Questions

1. A bond that makes no coupon payments and is initially priced at a deep discount is called a _____ bond.
A. Treasury
B. municipal
C. floating-rate
D. junk
E. zero coupon

Difficulty level: Easy
Topic: ZERO COUPON BONDS
Type: DEFINITIONS

2. An asset characterized by cash flows that increase at a constant rate forever is called a:
A. growing perpetuity.
B. growing annuity.
C. common annuity.
D. perpetuity due.
E. preferred stock.

Difficulty level: Easy
Topic: GROWING PERPETUITY
Type: DEFINITIONS

3. The stated interest payment, in dollars, made on a bond each period is called the bond's:
A. coupon.
B. face value.
C. maturity.
D. yield to maturity.
E. coupon rate.

Difficulty level: Easy
Topic: COUPON
Type: DEFINITIONS

4. The principal amount of a bond that is repaid at the end of the loan term is called the bond's:
A. coupon.
B. face value.
C. maturity.
D. yield to maturity.
E. coupon rate.

Difficulty level: Easy
Topic: FACE VALUE
Type: DEFINITIONS

5. The specified date on which the principal amount of a bond is repaid is called the bond's:
A. coupon.
B. face value.
C. maturity.
D. yield to maturity.
E. coupon rate.

Difficulty level: Easy
Topic: MATURITY
Type: DEFINITIONS

6. The rate of return required by investors in the market for owning a bond is called the:
A. coupon.
B. face value.
C. maturity.
D. yield to maturity.
E. coupon rate.

Difficulty level: Easy
Topic: YIELD TO MATURITY
Type: DEFINITIONS

7. The annual coupon of a bond divided by its face value is called the bond's:
A. coupon.
B. face value.
C. maturity.
D. yield to maturity.
E. coupon rate.

Difficulty level: Easy
Topic: COUPON RATE
Type: DEFINITIONS

8. A bond with a face value of $1,000 that sells for $1,000 in the market is called a _____ bond.
A. par value
B. discount
C. premium
D. zero coupon
E. floating rate

Difficulty level: Easy
Topic: PAR BONDS
Type: DEFINITIONS

9. A bond with a face value of $1,000 that sells for less than $1,000 in the market is called a _____ bond.
A. par
B. discount
C. premium
D. zero coupon
E. floating rate

Difficulty level: Easy
Topic: DISCOUNT BONDS
Type: DEFINITIONS

10. The relationship between nominal rates, real rates, and inflation is known as the:
A. Miller and Modigliani theorem.
B. Fisher effect.
C. Gordon growth model.
D. term structure of interest rates.
E. interest rate risk premium.

Difficulty level: Medium
Topic: FISHER EFFECT
Type: DEFINITIONS

11. The relationship between nominal interest rates on default-free, pure discount securities and the time to maturity is called the:
A. liquidity effect.
B. Fisher effect.
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D. inflation premium.
E. interest rate risk premium.

Difficulty level: Medium
Topic: TERM STRUCTURE OF INTEREST RATES
Type: DEFINITIONS

12. The _____ premium is that portion of a nominal interest rate or bond yield that represents compensation for expected future overall price appreciation.
A. default risk
B. taxability
C. liquidity
D. inflation
E. interest rate risk

Difficulty level: Easy
Topic: INFLATION PREMIUM
Type: DEFINITIONS

13. A bond with a 7% coupon that pays interest semi-annually and is priced at par will have a market price of _____ and interest payments in the amount of _____ each.
A. $1,007; $70
B. $1,070; $35
C. $1,070; $70
D. $1,000; $35
E. $1,000; $70

Difficulty level: Medium
Topic: BOND FEATURES
Type: CONCEPTS

14. All else constant, a bond will sell at _____ when the yield to maturity is _____ the coupon rate.
A. a premium; higher than
B. a premium; equal to
C. at par; higher than
D. at par; less than
E. a discount; higher than

Difficulty level: Medium
Topic: BOND PRICES AND YIELDS
Type: CONCEPTS

15. All else constant, a coupon bond that is selling at a premium, must have:
A. a coupon rate that is equal to the yield to maturity.
B. a market price that is less than par value.
C. semi-annual interest payments.
D. a yield to maturity that is less than the coupon rate.
E. a coupon rate that is less than the yield to maturity.

Difficulty level: Easy
Topic: BOND PRICES AND YIELDS
Type: CONCEPTS

16. The market price of a bond is equal to the present value of the:
A. face value minus the present value of the annuity payments.
B. annuity payments plus the future value of the face amount.
C. face value plus the present value of the annuity payments.
D. face value plus the future value of the annuity payments.
E. annuity payments minus the face value of the bond.

Difficulty level: Easy
Topic: BOND PRICES
Type: CONCEPTS

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B. II and III only
C. II, III, and IV only
D. I, II, and III only
E. I, III, and IV only

Difficulty level: Medium
Topic: SEMIANNNUAL BONDS
Type: CONCEPTS

18. The newly issued bonds of the Wynslow Corp. offer a 6% coupon with semiannual interest payments. The bonds are currently priced at par value. The effective annual rate provided by these bonds must be:
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B. greater than 3% but less than 4%.
C. equal to 6%.
D. greater than 6% but less than 7%.
E. equal to 12%.

Difficulty level: Medium
Topic: SEMIANNUAL BONDS AND EFFECTIVE ANNUAL RATE
Type: CONCEPTS

19. You own a bond that has a 7% coupon and matures in 12 years. You purchased this bond at par value when it was originally issued. If the current market rate for this type and quality of bond is 7.5%, then you would expect:
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D. today's market price to exceed the face value of the bond.
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Difficulty level: Medium
Topic: INTEREST RATE RISK
Type: CONCEPTS

20. A bond with semi-annual interest payments, all else equal, would be priced _____ than one with annual interest payments.
A. higher
B. lower
C. the same
D. it is impossible to tell
E. either higher or the same

Difficulty level: Medium
Topic: SEMI-ANNUAL PAYMENTS
Type: CONCEPTS

21. A zero coupon bond:
A. is sold at a large premium.
B. has a price equal to the future value of the face amount given a specified rate of return.
C. can only be issued by the U.S. Treasury.
D. has less interest rate risk than a comparable coupon bond.
E. has implicit interest which is calculated by amortizing the loan.

Difficulty level: Medium
Topic: ZERO COUPON BONDS
Type: CONCEPTS

22. The total interest paid on a zero-coupon bond is equal to:
A. zero.
B. the face value minus the issue price.
C. the face value minus the market price on the maturity date.
D. $1,000 minus the face value.
E. $1,000 minus the par value.

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Topic: ZERO COUPON BONDS
Type: CONCEPTS

23. The yield to maturity is:
A. the rate that equates the price of the bond with the discounted cash flows.
B. the expected rate to be earned if held to maturity.
C. the rate that is used to determine the market price of the bond.
D. equal to the current yield for bonds priced at par.
E. All of the above.

Difficulty level: Medium
Topic: YIELD TO MATURITY
Type: CONCEPTS

24. Face value is:
A. always higher than current price.
B. always lower than current price.
C. the same as the current price.
D. the coupon amount.
E. None of the above.

Difficulty level: Easy
Topic: FACE VALUE
Type: CONCEPTS

25. One basis point is equal to:
A. .01%.
B. .10%.
C. 1.0%.
D. 10%.
E. 100%.

Difficulty level: Easy
Topic: BASIS POINT
Type: CONCEPTS

26. The "EST SPREAD" shown in *The Wall Street Journal* listing of corporate bonds represents the estimated:
A. yield to maturity.
B. difference between the current yield and the yield to maturity.
C. difference between the bond's yield and the yield of a particular Treasury issue.
D. range of yields to maturity provided by the bond over its life to date.
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Difficulty level: Medium
Topic: CORPORATE BOND QUOTE
Type: CONCEPTS

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Topic: COUPON PAYMENT
Type: CONCEPTS

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Topic: YIELD TO MATURITY
Type: CONCEPTS

29. The Fisher formula is expressed as _____ where R is the nominal rate, r is the real rate, and h is the inflation rate.
A. $1 + r = (1 + R) \div (1 + h)$
B. $1 + r = (1 + R) \times (1 + h)$
C. $1 + h = (1 + r) \div (1 + R)$
D. $1 + R = (1 + r) \div (1 + h)$
E. $1 + R = (1 + r) \times (1 + h)$

Difficulty level: Medium
Topic: FISHER EFFECT
Type: CONCEPTS

30. The Fisher Effect primarily emphasizes the effects of _____ risk on an investor's rate of return.
A. default
B. market
C. interest rate
D. inflation
E. maturity

Difficulty level: Easy
Topic: FISHER EFFECT
Type: CONCEPTS

31. Consider a bond which pays 7% semiannually and has 8 years to maturity. The market requires an interest rate of 8% on bonds of this risk. What is this bond's price?
A. $942.50
B. $911.52
C. $941.74
D. $1,064.81
E. None of the above

N = 16 I/Y = 4 PMT = 35 FV = $1000 PV = ? = $941.74

Difficulty level: Easy
Topic: BOND VALUATION
Type: PROBLEMS

32. The value of a 20 year zero-coupon bond when the market required rate of return is 9% (semiannual) is ____.
A. $171.93
B. $178.43
C. $318.38
D. $414.64
E. None of the above

$\$1,000/(1.045)^{40} = \$171.93$

Difficulty level: Easy
Topic: ZERO COUPON BOND
Type: PROBLEMS

33. The bonds issued by Jensen & Son bear a 6% coupon, payable semiannually. The bond matures in 8 years and has a $1,000 face value. Currently, the bond sells at par. What is the yield to maturity?

A. 5.87%
B. 5.97%
C. 6.00%
D. 6.09%
E. 6.17%

$$\$1{,}000 = \frac{.06 \times \$1{,}000}{2} \times \left\{ \frac{1 - \left[1/(1 + \frac{r}{2})^{8 \times 2} \right]}{\frac{r}{2}} \right\} + \frac{\$1{,}000}{(1 + \frac{r}{2})^{8 \times 2}};$$

This can not be solved directly, so it's easiest to just use the calculator method to get an answer. You can then use the calculator answer as the rate in the formula just to verify that your answer is correct.

Enter	**8×2**	**/2**	**-1,000**	**60/2**	**1,000**
	N	**I/Y**	**PV**	**PMT**	**FV**

Solve for I/Y = 3 × 2 = 6

Answer is 6.00%

Difficulty level: Medium
Topic: YIELD TO MATURITY
Type: PROBLEMS

34. A General Co. bond has an 8% coupon and pays interest annually. The face value is $1,000 and the current market price is $1,020.50. The bond matures in 20 years. What is the yield to maturity?

A. 7.79%
B. 7.82%
C. 8.00%
D. 8.04%
E. 8.12%

$$\$1{,}020.50 = (.08 \times \$1{,}000) \times \left\{ \frac{1 - \left[1/(1+r)^{20}\right]}{r} \right\} + \frac{\$1{,}000}{(1+r)^{20}};$$

This can not be solved directly, so it's easiest to just use the calculator method to get an answer. You can then use the calculator answer as the rate in the formula just to verify that your answer is correct.

Enter	**20**		**-1,020.50**	**80**	**1,000**
	N	**I/Y**	**PV**	**PMT**	**FV**
Solve for		**7.79439**			

Answer is 7.79%

Difficulty level: Easy
Topic: YIELD TO MATURITY
Type: PROBLEMS

35. Winston Enterprises has a 15-year bond issue outstanding that pays a 9% coupon. The bond is currently priced at $894.60 and has a par value of $1,000. Interest is paid semiannually. What is the yield to maturity?
A. 8.67%
B. 10.13%
C. 10.16%
D. 10.40%
E. 10.45%

$$\$894.60 = \frac{.09 \times \$1{,}000}{2} \times \left\{ \frac{1 - \left[1/(1 + \frac{r}{2})^{15 \times 2} \right]}{\frac{r}{2}} \right\} + \frac{\$1{,}000}{(1 + \frac{r}{2})^{15 \times 2}};$$

This can not be solved directly, so it's easiest to just use the calculator method to get an answer. You can then use the calculator answer as the rate in the formula just to verify that your answer is correct.

Enter	**15×2**	**/2**	**-894.60**	**90/2**	**1,000**
	N	**I/Y**	**PV**	**PMT**	**FV**

Solve for I/Y = 5.20147 × 2 = 10.40294

Answer is 10.40% (rounded)

Difficulty level: Medium
Topic: YIELD TO MATURITY
Type: PROBLEMS

36. Wine and Roses, Inc. offers a 7% coupon bond with semiannual payments and a yield to maturity of 7.73%. The bonds mature in 9 years. What is the market price of a $1,000 face value bond?

A. $953.28
B. $963.88
C. $1,108.16
D. $1,401.26
E. $1,401.86

$$P = \frac{.07 \times \$1{,}000}{2} \times \left\{ \frac{1 - \left[1/(1 + \frac{.0773}{2})^{9 \times 2} \right]}{\frac{.0773}{2}} \right\} + \frac{\$1{,}000}{(1 + \frac{.0773}{2})^{9 \times 2}};$$

P = $447.977 + $505.305 = $953.282 = $953.28 (rounded)

Enter	**9×2**	**7.73/2**		**70/2**	**1,000**
	N	**I/Y**	**PV**	**PMT**	**FV**
Solve for			**-953.28**		

Difficulty level: Medium
Topic: PRICE OF COUPON BOND
Type: PROBLEMS

37. Party Time, Inc. has a 6% coupon bond that matures in 11 years. The bond pays interest semiannually. What is the market price of a $1,000 face value bond if the yield to maturity is 12.9%?

A. $434.59
B. $580.86
C. $600.34
D. $605.92
E. $947.87

$$P = \frac{.06 \times \$1{,}000}{2} \times \left\{ \frac{1 - \left[1/(1 + \frac{.129}{2})^{11 \times 2} \right]}{\frac{.129}{2}} \right\} + \frac{\$1{,}000}{(1 + \frac{.129}{2})^{11 \times 2}}$$ **; P = $347.53 + $252.81 = $600.34**

Enter	**11×2**	**12.9/2**		**60/2**	**1,000**
	N	**I/Y**	**PV**	**PMT**	**FV**
Solve for			**-600.34**		

Difficulty level: Medium
Topic: PRICE OF COUPON BOND
Type: PROBLEMS

38. Gugenheim, Inc. offers a 7% coupon bond with annual payments. The yield to maturity is 5.85% and the maturity date is 9 years. What is the market price of a $1,000 face value bond?
A. $742.66
B. $868.67
C. $869.67
D. $1,078.73
E. $1,079.59

$$P = (.07 \times \$1{,}000) \times \left\{ \frac{1 - \left[1/(1+.0585)^{9}\right]}{.0585} \right\} + \frac{\$1{,}000}{(1+.0585)^{9}} \text{; P = \$479.24 + \$599.49 = \$1,078.73}$$

Enter	**9**	**5.85**		**70**	**1,000**
	N	**I/Y**	**PV**	**PMT**	**FV**
Solve for			**-1,078.73**		

Difficulty level: Easy
Topic: PRICE OF COUPON BOND
Type: PROBLEMS

39. The Lo Sun Corporation offers a 6% bond with a current market price of $875.05. The yield to maturity is 7.34%. The face value is $1,000. Interest is paid semiannually. How many years is it until this bond matures?
A. 16 years
B. 18 years
C. 24 years
D. 30 years
E. 32 years

$$\$875.05 = \frac{.06 \times \$1{,}000}{2} \times \left\{ \frac{1 - \left[1/(1 + \frac{.0734}{2})^{t \times 2} \right]}{\frac{.0734}{2}} \right\} + \frac{\$1{,}000}{(1 + \frac{.0734}{2})^{t \times 2}};$$

The easiest way to solve this problem is using a financial calculator. You can then use the calculator answer as the time period in the formula just to verify that your answer is correct.

Enter		**7.34/2**	**-875.05**	**60/2**	**1,000**
	N	**I/Y**	**PV**	**PMT**	**FV**
Solve for	**32**				

The number of six-month periods is 32. The number of years is 16.

Difficulty level: Medium
Topic: TIME TO MATURITY OF COUPON BOND
Type: PROBLEMS

40. High Noon Sun, Inc. has a 5%, semiannual coupon bond with a current market price of $988.52. The bond has a par value of $1,000 and a yield to maturity of 5.29%. How many years is it until this bond matures?
A. 4.0 years
B. 4.5 years
C. 6.5 years
D. 8.0 years
E. 9.0 years

$$\$988.52 = \frac{.05 \times \$1{,}000}{2} \times \left\{ \frac{1 - \left[1/(1 + \frac{.0529}{2})^{t \times 2} \right]}{\frac{.0529}{2}} \right\} + \frac{\$1{,}000}{(1 + \frac{.0529}{2})^{t \times 2}};$$

The easiest way to solve this problem is using financial calculator. You can then use the calculator answer as the time period in the formula just to verify that your answer is correct.

Enter		**5.29/2**	**-988.52**	**50/2**	**1,000**
	N	**I/Y**	**PV**	**PMT**	**FV**
Solve for	**9**				

The number of six-month periods is 9. The number of years is 4.5.

Difficulty level: Medium
Topic: TIME TO MATURITY OF COUPON BOND
Type: PROBLEMS

41. Your firm offers a 10-year, zero coupon bond. The yield to maturity is 8.8%. What is the current market price of a $1,000 face value bond?
A. $430.24
B. $473.26
C. $835.56
D. $919.12
E. $1,088.00

$$P = \frac{\$1{,}000}{(1+.088)^{10}}\text{; P = \$430.24}$$

Enter	**10**	**8.8**			**1,000**
	N	**I/Y**	**PV**	**PMT**	**FV**
Solve for			**-430.24**		

Difficulty level: Easy
Topic: PRICE OF ZERO COUPON BOND
Type: PROBLEMS

42. Ted's Co. offers a zero coupon bond with an 11.3% yield to maturity. The bond matures in 16 years. What is the current price of a $1,000 face value bond?
A. $178.78
B. $180.33
C. $188.36
D. $190.09
E. $192.18

$$P = \frac{\$1{,}000}{(1+.113)^{16}}\text{; P = \$180.33}$$

Enter	**16**	**11.3**			**1,000**
	N	**I/Y**	**PV**	**PMT**	**FV**
Solve for			**-180.33**		

Difficulty level: Easy
Topic: PRICE OF ZERO COUPON BOND
Type: PROBLEMS

43. The zero coupon bonds of Markco, Inc. have a market price of $394.47, a face value of $1,000, and a yield to maturity of 6.87%. How many years is it until this bond matures?
A. 7 years
B. 10 years
C. 14 years
D. 18 years
E. 21 years

$$\$394.47 = \frac{\$1{,}000}{(1+.0687)^{t}}\text{; } \mathbf{t \times ln1.0687 = ln2.53505;\ t = 14}$$

Enter		**6.87**	**-394.47**		**1,000**
	N	**I/Y**	**PV**	**PMT**	**FV**
Solve for	**14**				

Difficulty level: Easy
Topic: TIME TO MATURITY OF ZERO COUPON BOND
Type: PROBLEMS

44. A 12-year, 5% coupon bond pays interest annually. The bond has a face value of $1,000. What is the change in the price of this bond if the market yield rises to 6% from the current yield of 4.5%?
A. 11.11% decrease
B. 12.38% decrease
C. 12.38% increase
D. 14.13% decrease
E. 14.13% increase

$$P = (.05 \times \$1{,}000) \times \left\{ \frac{1 - \left[1/(1+.045)^{12}\right]}{.045} \right\} + \frac{\$1{,}000}{(1+.045)^{12}}$$; **P = $455.93 + $589.66 = $1,045.59**

Enter	**12**	**4.5**		**50**	**1,000**
	N	**I/Y**	**PV**	**PMT**	**FV**
Solve for			**-1,045.59**		

$$P = (.05 \times \$1{,}000) \times \left\{ \frac{1 - \left[1/(1+.06)^{12}\right]}{.06} \right\} + \frac{\$1{,}000}{(1+.06)^{12}}$$; **P = $419.19 + $496.97 = $916.16**

Enter	**12**	**6**		**50**	**1,000**
	N	**I/Y**	**PV**	**PMT**	**FV**
Solve for			**-916.16**		

Change in price = $\frac{\$916.16 - \$1{,}045.59}{\$1{,}045.59} = -12.38$ **% (decrease)**

Difficulty level: Medium
Topic: INTEREST RATE RISK
Type: PROBLEMS

45. Jackson Central has a 6-year, 8% annual coupon bond with a $1,000 par value. Earls Enterprises has a 12-year, 8% annual coupon bond with a $1,000 par value. Both bonds currently have a yield to maturity of 6%. Which of the following statements are correct if the market yield increases to 7%?
A. Both bonds would decrease in value by 4.61%.
B. The Earls bond will increase in value by $88.25.
C. The Jackson bond will increase in value by 4.61%.
D. The Earls bond will decrease in value by 7.56%.
E. The Earls bond will decrease in value by $50.68.

$$P_{Jackson} = (.08 \times \$1{,}000) \times \left\{\frac{1 - \left[1/(1+.06)^{6}\right]}{.06}\right\} + \frac{\$1{,}000}{(1+.06)^{6}}$$ **; P = $393.39 + $704.96 = $1,098.35**

Enter	**6**	**6**		**80**	**1,000**
	N	**I/Y**	**PV**	**PMT**	**FV**
Solve for			**-1,098.35**		

$$P_{Jackson} = (.08 \times \$1{,}000) \times \left\{\frac{1 - \left[1/(1+.07)^{6}\right]}{.07}\right\} + \frac{\$1{,}000}{(1+.07)^{6}};$$

P = $381.323 + $666.342 = $1,047.665 = $1,047.67 (rounded)

Enter	**6**	**7**		**80**	**1,000**
	N	**I/Y**	**PV**	**PMT**	**FV**
Solve for			**-1,047.67**		

Difference in Jackson's prices = $1,047.67 - $1,098.35 = -$50.68 (decrease) percentage difference in Jackson's prices = $\frac{\$1{,}047.67 - \$1{,}098.35}{\$1{,}098.35} = -.04614 = -4.61$ **%**

$$P_{Earls} = (.08 \times \$1{,}000) \times \left\{\frac{1 - \left[1/(1+.07)^{12}\right]}{.07}\right\} + \frac{\$1{,}000}{(1+.07)^{12}};$$

P = $635.415 + $444.012 = $1,079.427 = $1,079.43 (rounded)

Enter	**12**	**7**		**80**	**1,000**
	N	**I/Y**	**PV**	**PMT**	**FV**
Solve for			**-1,079.43**		

Difference in Earls' prices = $1,079.43 - $1,167.68 = -$88.25 (decrease) percentage difference in Earls' prices = $\frac{\$1{,}079.43 - \$1{,}167.68}{\$1{,}167.68} = -.07558 = -7.56$ **%** (decrease)
The correct answer states that the Earls' bond will decrease in value by 7.56%.

Difficulty level: Challenge
Topic: INTEREST RATE RISK
Type: PROBLEMS

46. A corporate bond is quoted at a current price of 102.767. What is the market price of a bond with a $1,000 face value?
A. $1,000.28
B. $1,002.77
C. $1,027.67
D. $1,102.77
E. $1,276.70

Market price = 102.767 × 10 = $1,027.67

Difficulty level: Easy
Topic: CORPORATE BOND QUOTE
Type: PROBLEMS

47. A zero coupon bond with a face value of $1,000 is issued with an initial price of $463.34. The bond matures in 25 years. What is the implicit interest, in dollars, for the first year of the bond's life?
A. $9.08
B. $12.56
C. $14.48
D. $21.47
E. $31.25

$\$463.34 = \frac{\$1{,}000}{(1+r)^{25}}$; r = 3.125%; PV = $\frac{\$1{,}000}{(1+.03125)^{24}}$ = $477.82; Implicit interest = $477.82 - $463.34 = $14.48

Difficulty level: Medium
Topic: ZERO COUPON BOND AND IMPLICIT INTEREST
Type: PROBLEMS

48. The MerryWeather Firm wants to raise $10 million to expand its business. To accomplish this, it plans to sell 30-year, $1,000 face value zero-coupon bonds. The bonds will be priced to yield 6%. What is the minimum number of bonds it must sell to raise the $10 million it needs?
A. 47,411
B. 52,667
C. 57,435
D. 60,000
E. 117,435

$PV = \frac{\$1{,}000}{(1+.06)^{30}} = \$174.11; \quad \frac{\$10{,}000{,}000}{\$174.11} = \$57{,}435$ (rounded)

Difficulty level: Medium
Topic: ZERO COUPON BOND PRICING
Type: PROBLEMS

49. Which of the following amounts is closest to the value of a bond that pays $55 semiannually and has an effective semiannual interest rate of 5%? The face value is $1,000 and the bond matures in 3 years. There are exactly six months before the first interest payment.
A. $888
B. $1,000
C. $1,014
D. $1,025
E. $1,055

Value = $55($PVIFA_{5\%,6}$) + $1,000($PVIF_{5\%,6}$) = $279.16 + $746.22 = $1,025.38

Difficulty level: Medium
Topic: BOND VALUATION
Type: PROBLEMS

50. Zeta Corporation has issued a $1,000 face value zero-coupon bond. Which of the following values is closest to the correct price for the bond if the appropriate discount rate is 4% and the bond matures in 8 years?
A. $730.69
B. $968.00
C. $1,000.00
D. $1,032.00
E. This problem cannot be worked without the annual interest payments provided

Current Price = Face Value/$(1 + r)^n$ = 1000/$(1 + 0.04)^8$ = $730.69

Difficulty level: Medium
Topic: ZERO COUPON BOND
Type: PROBLEMS

51. A corporate bond with a face value of $1,000 matures in 4 years and has an 8% coupon paid at the end of each year. The current price of the bond is $932. What is the yield to maturity for this bond?
A. 5.05%
B. 6.48%
C. 8.58%
D. 10.15%
E. 11.92%

Current Price = Int($PVIFA_{r,4}$) + Face value($PVIF_{r,4}$) $932 = $80[1 - 1/$(1 + r)^4$]/r + $1000/$(1 + r)^4$ r = 10.152

Difficulty level: Medium
Topic: YIELD TO MATURITY
Type: PROBLEMS

52. A bond that pays interest annually yields a 7.25% rate of return. The inflation rate for the same period is 3.5%. What is the real rate of return on this bond?
A. 3.50%
B. 3.57%
C. 3.62%
D. 3.72%
E. 3.75%

$(1 + .0725) = (1 + r) \times (1 + .035)$; r = 3.62%

Difficulty level: Easy
Topic: FISHER EFFECT
Type: PROBLEMS

53. The bonds of Frank's Welding, Inc. pay an 8% coupon, have a 7.98% yield to maturity and have a face value of $1,000. The current rate of inflation is 2.5%. What is the real rate of return on these bonds?
A. 5.32%
B. 5.35%
C. 5.37%
D. 5.42%
E. 5.48%

$(1 + .0798) = (1 + r) \times (1 + .025)$; r = 5.35%

Difficulty level: Medium
Topic: FISHER EFFECT
Type: PROBLEMS

54. The outstanding bonds of Roy Thomas, Inc. provide a real rate of return of 3.6%. The current rate of inflation is 2.5%. What is the nominal rate of return on these bonds?
A. 6.10%
B. 6.13%
C. 6.16%
D. 6.19%
E. 6.22%

$(1 + .036) \times (1 + .025) - 1 = .0619 = 6.19\%$

Difficulty level: Easy
Topic: FISHER EFFECT
Type: PROBLEMS

55. The nominal rate of return on the bonds of Stu's Boats is 8.75%. The real rate of return is 3.4%. What is the rate of inflation?
A. 5.17%
B. 5.28%
C. 5.35%
D. 5.43%
E. 5.49%

$(1 + .0875) = (1 + .034) \times (1 + h)$; $h = 5.17\%$

Difficulty level: Easy
Topic: FISHER EFFECT
Type: PROBLEMS

Essay Questions

56. Calculate the YTM on a bond priced at $1,036 which has 2 years to maturity, a 10% annual coupon rate, and a return of $1,000 at maturity.

$1,036 = $100/(1 + YTM)^1 + $1,100/(1 + YTM)^2? YTM = 8%.
CALC: N = 2; PV = $1,036; PMT = $-100; FV = $-c1000 I/YR = ? = 7.98%

Topic: YIELD TO MATURITY
Type: ESSAYS

57. Given the opportunity to invest in one of the three bonds listed below, which would you purchase? Assume an interest rate of 7%.

Bond	Face Value	Annual Coupon Rate	Maturity	Price
A	$1,000	4%	1 year	$990
B	$1,000	7.5%	17 years	$990
C	$1,000	8.5%	25 years	$990

PV of Bond A = $971.96 < Price Do not buy YTM (5.05%)
PV of Bond B = $1,048.82 > Price Buy YTM (7.61%)
PV of Bond C = $1,174.80 > Price Buy YTM (8.6%)
Since risk is equivalent, purchase Bond C over Bond B. If funds remain, one may purchase Bond B also since both Bonds B and C are underpriced.

Topic: BOND VALUATION
Type: ESSAYS

58. Explain why some bond investors are subject to liquidity risk, default risk, and/or taxability risk. How does each of these risks affect the yield of a bond?

Liquidity problems exist in thinly traded bonds making some bonds difficult to sell at their actual value. Default risk is the likelihood the corporation will default on its bond obligations. Taxability risk reflects the fact that some bonds are taxed disadvantageously compared to others. If any of these risks exist, investors will require compensation by demanding a high yield.

Topic: BOND YIELD PREMIUMS
Type: ESSAYS

59. Define what is meant by interest rate risk. Assume you are the manager of a $100 million portfolio of corporate bonds and you believe interest rates will fall. What adjustments should you make to your portfolio based on your beliefs?

Interest rate risk is the risk that arises for bond owners from fluctuating interest rates. All else the same, if interest rates are expected to fall you should purchase long-term bonds and/or low coupon bonds, and sell shorter-term, higher-coupon bonds.

Topic: INTEREST RATE RISK
Type: ESSAYS

60. Why do corporations issue 100-year bonds, knowing that interest rate risk is highest for very long-term bonds? How does the interest rate risk affect the issuer?

Essentially, the issuer takes the opposite side of the interest rate risk position. By issuing long-term bonds, the corporation is essentially betting that rates won't fall significantly. If they do, the corporation will incur a loss due to borrowing at rates higher than the going market rates. On the other hand, if rates rise, the corporation benefits by having locked in its borrowing rate for up to 100 years. In addition, these bonds are a source of long-term financing where the cost, i.e. the interest, is tax deductible. If the firm should issue stocks, the cost, i.e. the dividends, are not tax deductible. This is why the IRS frowns on 100 year bonds.

Topic: INTEREST RATE RISK AND THE ISSUER
Type: ESSAYS

61. In the early 1980s, the Treasury yield curve had a severe downward slope with short-term yields near 20% and long-term yields below 15%. Explain how such a pattern might occur.

The downward slope occurs because the expected inflation premium is declining. The decline in the inflation premium is significant enough to overcome the interest rate risk premium.

Topic: YIELD CURVE
Type: ESSAYS

62. Interest rate risk is often explained by using the concept of a teeter-totter. Explain interest rate risk and how it is related to the movements of a teeter-totter.

Interest rates sit on one end of the teeter-totter while bond prices sit on the other end. As interest rates move up, bond prices move down as seen by the movements of a teeter-totter. Movement in the opposite direction also applies.
In addition, short-term bonds are located a short distance from the fulcrum while long-term bonds are situated towards the end of the teeter-totter, illustrating that long-term bonds move further in reaction to a change in interest rates than do short-term bonds.

Topic: BOND RATINGS
Type: ESSAYS

63. The discussion of asset pricing in the text suggests that an investor will be indifferent between two bonds which have equal yields to maturity as long as they have equivalent default risk. Can you think of any real-world factors which might make a given investor prefer one of these bonds over the other?

Note that the question only implies the bonds have the same yields and bond ratings. There are the additional issues of taxability, liquidity and interest rate risk. Students should be able to recap the discussion on the determinants of bond yields.

Topic: BOND VALUATION
Type: ESSAYS

64. Sometimes it is not clear if a particular security is debt or equity. Explain the basic difference between debt and equity.

This can boil down to a legal and semantic issue with hybrid securities, but at this stage, it is expected the student recognizes that equity represents an ownership interest and it is a residual claim in the firm. This means that equity holders are paid after debt holders which increases the risk of equity ownership over debt ownership. We will soon see this increased risk is rewarded by a higher required rate of return. Debt holders, on the other hand, have an upper limit on their wealth; that being the payment of periodic interest and the repayment of principal.

Topic: DEBT OR EQUITY
Type: ESSAYS