CONCEPT QUESTIONS

1. **Compounding and Period** As you increase the length of time involved, what happens to future values? What happens to present values?

2. **Interest Rates** What happens to the future value of an annuity if you increase the rate *r*? What happens to the present value?

3. **Present Value** Suppose two athletes sign 10-year contracts for $80 million. In one case, we're told that the $80 million will be paid in 10 equal installments. In the other case, we're told that the $80 million will be paid in 10 installments, but the installments will increase by 5 percent per year. Who got the better deal?

4. **APR and EAR** Should lending laws be changed to require lenders to report EARs instead of APRs? Why or why not?

5. **Time Value** On subsidized Stafford loans, a common source of financial aid for college students, interest does not begin to accrue until repayment begins. Who receives a bigger subsidy, a freshman or a senior? Explain.

   Use the following information for Questions 6-10:

   Toyota Motor Credit Corporation (TMCC), a subsidiary of Toyota Motor Corporation, offered some securities for sale to the public on March 28, 2008. Under the terms of the deal, TMCC promised to repay the owner of one of these securities $100,000 on March 28, 2038, but investors would receive nothing until then. Investors paid TMCC $24,099 for each of these securities, so they gave up $24,099 on March 28, 2008, for the promise of a $100,000 payment 30 years later.

6. **Time Value of Money** Why would TMCC be willing to accept such a small amount today ($24,099) in exchange for a promise to repay about four times that amount ($100,000) in the future?

7. **Call Provisions** TMCC has the right to buy back the securities on the anniversary date at a price established when the securities were issued (this feature is a term of this particular deal). What impact does this feature have on the desirability of this security as an investment?

8. **Time Value of Money** Would you be willing to pay $24,099 today in exchange for $100,000 in 30 years? What would be the key considerations in answering yes or no? Would your answer depend on who is making the promise to repay?

9. **Investment Comparison** Suppose that when TMCC offered the security for $24,099 the U.S. Treasury had offered an essentially identical security. Do you think it would have had a higher or lower price? Why?

10. **Length of Investment** The TMCC security is bought and sold on the New York Stock Exchange. If you looked at the price today, do you think the price would exceed the $24,099 original price? Why? If you looked in the year 2019, do you think the price would be higher or lower than today's price? Why?

QUESTIONS AND PROBLEMS

connect

Basic (Questions 1–20)

1. **Simple Interest versus Compound Interest** First City Bank pays 7 percent simple interest on its savings account balances, whereas Second City Bank pays 7 percent interest compounded annually. If you made a $4,800 deposit in each bank, how much more money would you earn from your Second City Bank account at the end of 10 years?

2. **Calculating Future Values** Compute the future value of $3,550 compounded annually for:

   a. 10 years at 6 percent.

   b. 10 years at 8 percent.

   c. 20 years at 6 percent.

   d. Why is the interest earned in part (c) not twice the amount earned in part (a)?

3.

Calculating Present Values For each of the following, compute the present value: page 119

PRESENT VALUE	YEARS	INTEREST RATE	FUTURE VALUE
	9	7%	$ 15,451
	13	9	51,557
	16	14	886,073
	24	11	550,164

4. **Calculating Interest Rates** Solve for the unknown interest rate in each of the following:

PRESENT VALUE	YEARS	INTEREST RATE	FUTURE VALUE
$ 217	3		$ 293
432	10		1,053
41,000	16		162,181
54,382	19		483,500

5. **Calculating the Number of Periods** Solve for the unknown number of years in each of the following:

PRESENT VALUE	YEARS	INTEREST RATE	FUTURE VALUE
$ 625		6%	$ 1,284
810		9	4,341
18,400		7	234,162
21,500		10	215,000

6. **Calculating the Number of Periods** At 5.75 percent interest, how long does it take to double your money? To quadruple it?

7. **Calculating Present Values** Imprudential, Inc., has an unfunded pension liability of $540 million that must be paid in 20 years. To assess the value of the firm's stock, financial analysts want to discount this liability back to the present. If the relevant discount rate is 5.6 percent, what is the present value of this liability?

8. **Calculating Rates of Return** Although appealing to more refined tastes, art as a collectible has not always performed so profitably. In 2010, Deutscher-Menzies sold *Arkie Under the Shower,* a painting by renowned Australian painter Brett Whiteley, at auction for a price of $1,100,000. Unfortunately for the previous owner, he had purchased it three years earlier at a price of $1,680,000. What was his annual rate of return on this painting?

9. **Perpetuities** An investor purchasing a British consol is entitled to receive annual payments from the British government forever. What is the price of a consol that pays $80 annually if the next payment occurs one year from today? The market interest rate is 2.6 percent.

10. **Continuous Compounding** Compute the future value of $1,625 continuously compounded for

   a. Five years at an annual percentage rate of 14 percent.

   b. Three years at an annual percentage rate of 6 percent.

   c. Ten years at an annual percentage rate of 8 percent.

   d. Eight years at an annual percentage rate of 9 percent.

11. PRINTED

Present Value and Multiple Cash Flows Machine Co. has identified an investment project with the following cash flows. If the discount rate is 5 percent, what is the present value of these cash flows? What is the present value at 13 percent? At 18 percent? page 120

YEAR	CASH FLOW
1	$ 585
2	815
3	1,630
4	2,140

11. **Present Value and Multiple Cash Flows** Investment X offers to pay you $4,850 per year for nine years, whereas Investment Y offers to pay you $6,775 per year for five years. Which of these cash flow streams has the higher present value if the discount rate is 5 percent? If the discount rate is 21 percent?

12. **Calculating Annuity Present Value** An investment offers $5,500 per year for 15 years, with the first payment occurring one year from now. If the required return is 7.5 percent, what is the value of the investment? What would the value be if the payments occurred for 40 years? For 75 years? Forever?

13. **Calculating Perpetuity Values** The Perpetual Life Insurance Co. is trying to sell you an investment policy that will pay you and your heirs $18,000 per year forever. If the required return on this investment is 4.3 percent, how much will you pay for the policy? Suppose the company told you the policy costs $445,000. At what interest rate would this be a fair deal?

14. **Calculating EAR** Find the EAR in each of the following cases:

APR	NUMBER OF TIMES COMPOUNDED	EAR
9.8%	Quarterly	
12.4	Monthly	
7.6	Daily	
8.4	Infinite	

15. **Calculating APR** Find the APR in each of the following cases:

APR	NUMBER OF TIMES COMPOUNDED	EAR
	Semiannually	10.4%
	Monthly	8.9
	Weekly	11.6

	Infinite	15.4

16. **Calculating EAR** First National Bank charges 15.7 percent compounded monthly on its business loans. First United Bank charges 16.2 percent compounded semiannually. As a potential borrower, which bank would you go to for a new loan?

17. **Interest Rates** Well-known financial writer Andrew Tobias argues that he can earn 177 percent per year buying wine by the case. Specifically, he assumes that he will consume one $10 bottle of fine Bordeaux per week for the next 12 weeks. He can either pay $10 per week or buy a case of 12 bottles today. If he buys the case, he receives a 10 percent discount, and, by doing so, earns the 177 percent. Assume he buys the wine and consumes the first bottle today. Do you agree with his analysis? Do you see a problem with his numbers?

Rating Agencies A controversy erupted regarding bond-rating agencies when some agencies began to provide unsolicited bond ratings. Why do you think this is controversial? page 159

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Bonds as Equity The 100-year bonds we discussed in the chapter have something in common with junk bonds. Critics charge that, in both cases, the issuers are really selling equity in disguise. What are the issues here? Why would a company want to sell "equity in disguise"?

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Bond Prices versus Yields

a. What is the relationship between the price of a bond and its YTM?

b. Explain why some bonds sell at a premium over par value while other bonds sell at a discount. What do you know about the relationship between the coupon rate and the YTM for premium bonds? What about for discount bonds? For bonds selling at par value?

c. What is the relationship between the current yield and YTM for premium bonds? For discount bonds? For bonds selling at par value?

•

Interest Rate Risk All else being the same, which has more interest rate risk, a long-term bond or a short-term bond? What about a low coupon bond compared to a high coupon bond? What about a long-term, high coupon bond compared to a short-term, low coupon bond?

QUESTIONS AND PROBLEMS

connect

Basic (Questions 1–15)

1. **Valuing Bonds** What is the dollar price of a zero coupon bond with 17 years to maturity, semiannual compounding, and a par value of $1,000, if the YTM is
   a. 4 percent
   b. 10 percent
   c. 14 percent

2. **Valuing Bonds** Microhard has issued a bond with the following characteristics:

   Par: $1,000

   Time to maturity: 23 years

   Coupon rate: 7 percent

Semiannual payments

Calculate the price of this bond if the YTM is

a. 7 percent
b. 9 percent
c. 5 percent

3. **Bond Yields** Skolits Corp. issued 15-year bonds two years ago at a coupon rate of 5.1 percent. The bonds make semiannual payments. If these bonds currently sell for 105 percent of par value, what is the YTM?

4. **Coupon Rates** Lydic Corporation has bonds on the market with 12.5 years to maturity, a YTM of 6.4 percent, a par value of $1,000, and a current price of $1,040. The bonds make semiannual payments. What must the coupon rate be on these bonds?

5. **Valuing Bonds** Even though most corporate bonds in the United States make coupon payments semiannually, bonds issued elsewhere often have annual coupon payments. Suppose a German company has a bond outstanding with a par value of €1,000, 16 years to maturity, and a coupon rate of 4.7 percent paid annually. If the yield to maturity is 3.4 percent, what is the current price of the bond?

6. **Bond Yields** A Japanese company has a bond outstanding that sells for 103.25 percent of its ¥100,000 par value. The bond has a coupon rate of 4.9 percent paid annually and matures in 18 years. What is the yield to maturity of this bond?

Calculating Real Rates of Return **If Treasury bills are currently paying 4.8 percent and the inflation rate is 2.7 percent, what is the approximate real rate of interest? The exact real rate?** page 160

8. **Inflation and Nominal Returns** Suppose the real rate is 1.8 percent and the inflation rate is 3.4 percent. What rate would you expect to see on a Treasury bill?

9. **Nominal and Real Returns** An investment offers a total return of 12.1 percent over the coming year. Alan Wingspan thinks the total real return on this investment will be only 7.6 percent. What does Alan believe the inflation rate will be over the next year?

10. **Nominal versus Real Returns** Say you own an asset that had a total return last year of 11.4 percent. If the inflation rate last year was 3.9 percent, what was your real return?

11. **Zero Coupon Bonds** You find a zero coupon bond with a par value of $10,000 and 17 years to maturity. If the yield to maturity on this bond if 4.9 percent, what is the dollar price of the bond? Assume semiannual compounding periods.

12. **Valuing Bonds** Mycroft Corp. has a $2,000 par value bond outstanding with a coupon rate of 4.9 percent paid semiannually and 13 years to maturity. The yield to maturity of the bond is 3.8 percent. What is the dollar price of the bond?

13. **Valuing Bonds** Union Local School District has bonds outstanding with a coupon rate of 3.7 percent paid semiannually and 16 years to maturity. The yield to maturity on these bonds is 3.9 percent and the bonds have a par value of $5,000. What is the price of the bonds?

14. **Using Treasury Quotes** Locate the Treasury bond in Figure 5.4 that matures in August 2028. What is its coupon rate? What is its bid price? What was the *previous day's* asked price? Assume a par value of $1,000.

15. **Using Treasury Quotes** Locate the Treasury bond in Figure 5.4 that matures in August 2039. Is this a premium or a discount bond? What is its current yield? What is its yield to maturity? What is the bid-ask spread in dollars? Assume a $1,000 par value.

Intermediate (Questions 16–26)

16. **Bond Price Movements** Miller Corporation has a premium bond making semiannual payments. The bond has a coupon rate of 8.2 percent, a YTM of 6.2 percent, and 13 years to maturity. The Modigliani Company has a discount bond making semiannual payments. This bond has a coupon rate of 6.2 percent, a YTM of 8.2 percent, and also has 13 years to maturity. If interest rates remain unchanged, what do you expect the price of these bonds to be 1 year from now assuming both bonds have a par value of $1,000? In 3 years? In 8 years? In 12 years? In 13 years? What's going on here? Illustrate your answers by graphing bond prices versus time to maturity.

17. **Interest Rate Risk** Laurel, Inc., and Hardy Corp. both have 6.5 percent coupon bonds outstanding, with semiannual interest payments, and both are currently priced at the par value of $1,000. The Laurel, Inc., bond has 4 years to maturity, whereas the Hardy Corp. bond has 23 years to maturity. If interest rates suddenly rise by 2 percent, what is the percentage change in the price of these bonds? If interest rates were to suddenly fall by 2 percent instead, what would the percentage change in the price of these bonds be then?

Illustrate your answers by graphing bond prices versus YTM. What does this problem tell you about the interest rate risk of longer-term bonds?

18. **Interest Rate Risk** The Faulk Corp. has a bond with a coupon rate of 5.7 percent outstanding. The Gonas Company has a bond with a coupon rate of 12.3 percent outstanding. Both bonds have 14 years to maturity, make semiannual payments, and have a YTM of 9 percent. If interest rates suddenly rise by 2 percent, what is the percentage change in the price of these bonds? What if interest rates suddenly fall by 2 percent instead? What does this problem tell you about the interest rate risk of lower coupon bonds?

19. **Bond Yields** Bonino Software has 6.4 percent coupon bonds on the market with 11 years to maturity. The bonds make semiannual payments and currently sell for 108 percent of par. What is the current yield on the bonds? The YTM? The effective annual yield?

20. **Bond Yields** Hagelin Co. wants to issue new 20-year bonds for some much-needed expansion projects. The company currently has 6.4 percent coupon bonds on the market that sell for $1,121.80, make semiannual payments,

QUESTIONS AND PROBLEMS

connect

Basic (Questions 1–13)

1. **Stock Values** The Herjavec Co. just paid a dividend of $2.57 per share on its stock. The dividends are expected to grow at a constant rate of 4 percent per year indefinitely. If investors require a return of 11 percent on the stock, what is the current price? What will the price be in three years? In 15 years?

2. **Stock Values** The next dividend payment by Greiner, Inc., will be $2.14 per share. The dividends are anticipated to maintain a growth rate of 4.4 percent forever. If the stock currently sells for $32 per share, what is the required return?

3. **Stock Values** For the company in the previous problem, what is the dividend yield? What is the expected capital gains yield?

4. **Stock Values** Cuban Corporation will pay a dividend of $3.08 per share next year. The company pledges to increase its dividend by 4.6 percent per year indefinitely. If you require a return of 11 percent on your investment, how much will you pay for the company's stock today?

5. **Stock Valuation** O'Leary, Inc., is expected to maintain a constant 4.1 percent growth rate in its dividend indefinitely. If the company has a dividend yield of 5.4 percent, what is the required return on the company's stock?

6. **Stock Valuation** Suppose you know that a company's stock currently sells for $63 per share and the required return on the stock is 10.4 percent. You also know that the total return on the stock is evenly divided between a capital gains yield and a dividend yield. If it's the company's policy to always maintain a constant growth rate in its dividends, what is the current dividend per share?

7. **Stock Valuation** Corcoran Corp. pays a constant $10.25 dividend on its stock. The company will maintain this dividend for the next eight years and will then cease paying dividends forever. If the required return on this stock is 9.7 percent, what is the current share price?

8. **Valuing Preferred Stock** John, Inc., has an issue of preferred stock outstanding that pays a dividend of $3.85 every year in perpetuity. If this issue currently sells for $108 per share, what is the required return?

9. **Growth Rate** The newspaper reported last week that Tisch Enterprises earned $38.6 million this year. The report also stated that the firm's return on equity is 14 percent. The firm retains 75 percent of its earnings. What is the firm's earnings growth rate? What will next year's earnings be?

10. **Stock Valuation and Required Return** Red, Inc., Yellow Corp., and Blue Company each will pay a dividend of $2.86 next year. The growth rate in dividends for all three companies is 5 percent. The required return for each company's stock is 8 percent, 11

percent, and 14 percent, respectively. What is the stock price for each company? What do you conclude about the relationship between the required return and the stock price?

11. **Voting Rights** After successfully completing your corporate finance class, you feel the next challenge ahead is to serve on the board of directors of DeJoria Enterprises. Unfortunately, you will be the only person voting for you. If the company has 415,000 shares outstanding, and the stock currently sells for $37, how much will it cost you to buy a seat if the company uses straight voting?

12. **Voting Rights** In the previous problem, assume that the company uses cumulative voting and there are four seats in the current election. How much will it cost you to buy a seat now?

13. **Stock Valuation and PE** The Blooming Flower Co. has earnings of $2.14 per share. The benchmark PE for the company from a comparables analysis is 18. What stock price would you consider appropriate? What if the benchmark PE were 21?

Intermediate (Questions 14–32)

14. **Stock Valuation** Universal Laser, Inc., just paid a dividend of $2.73 on its stock. The growth rate in dividends is expected to be a constant 4 percent per year indefinitely. Investors require a return of 15 percent on the stock for the first three years, a return of 13 percent for the next three years, and then a return of 10 percent thereafter. What is the current share price for the stock?

15. **Nonconstant Growth** Metallica Bearings, Inc., is a young start-up company. No dividends will be paid on the stock over the next 11 years, because the firm needs to plow back its earnings to fuel growth. The company will pay a dividend of $17 per share exactly 12 years from today and will increase the dividend by 5.5 percent per year thereafter. If the required return on this stock is 13 percent, what is the current share price?

16.

Nonconstant Dividends **Morning Dew, Inc., has an odd dividend policy. The company has just paid a dividend of $13 per share and has announced that it will increase the dividend by $3.50 per share for each of the next five years, and then never pay another dividend. If you require a return of 11 percent on the company's stock, how much will you pay for a share today?** page 191

17. **Nonconstant Dividends** East Side Corporation is expected to pay the following dividends over the next four years: $12, $8, $7, and $2.85. Afterward, the company pledges to maintain a constant 5 percent growth rate in dividends forever. If the required return on the stock is 10 percent, what is the current share price?

18. **Differential Growth** Upton Co. is growing quickly. Dividends are expected to grow at 27 percent for the next three years, with the growth rate falling off to a constant 4.5 percent thereafter. If the required return is 10.4 percent and the company just paid a dividend of $2.65, what is the current share price?

19. **Differential Growth** Synovec Corp. is experiencing rapid growth. Dividends are expected to grow at 27 percent per year during the next three years, 18 percent over the following year, and then 4 percent per year indefinitely. The required return on this stock is 10 percent, and the stock currently sells for $71 per share. What is the projected dividend for the coming year?

20. **Negative Growth** Antiques R Us is a mature manufacturing firm. The company just paid a dividend of $16, but management expects to reduce the payout by 3 percent per year indefinitely. If you require a return of 9.3 percent on this stock, what will you pay for a share today?

21. **Finding the Dividend** Vulcano Corporation stock currently sells for $57.13 per share. The market requires a return of 11 percent on the firm's stock. If the company maintains a constant 5 percent growth rate in dividends, what was the most recent dividend per share paid on the stock?

22. **Valuing Preferred Stock** Fifth National Bank just issued some new preferred stock. The issue will pay an annual dividend of $6 in perpetuity, beginning 10 years from now. If the market requires a return of 4.6 percent on this investment, how much does a share of preferred stock cost today?

23. **Using Stock Quotes** You have found the following stock quote for RJW Enterprises, Inc., in the financial pages of today's newspaper. What is the annual dividend? What was the closing price for this stock that appeared in *yesterday's* paper? If the company currently has 25 million shares of stock outstanding, what was net income for the most recent four quarters?

YTD %CHG	STOCK	SYM	YLD	PE	LAST	NET CHG
9.6	RJW Enterp.	RJW	2.7	22	34.18	.19

24. **Taxes and Stock Price** You own $100,000 worth of Smart Money stock. One year from now, you will receive a dividend of $2.65 per share. You will receive a dividend of $2.85 two years from now. You will sell the stock for $91 per share three years from now.

Dividends are taxed at the rate of 20 percent. Assume there is no capital gains tax. The required aftertax rate of return is 9 percent. How many shares of stock do you own?

25. **Nonconstant Growth and Quarterly Dividends** Candescent Gold, Inc., will pay a quarterly dividend per share of $.58 at the end of each of the next 12 quarters. Thereafter, the dividend will grow at a quarterly rate of 1.1 percent forever. The appropriate rate of return on the stock is 10 percent, compounded quarterly. What is the current stock price?

26. **Finding the Dividend** Vignette, Inc., is expected to pay equal dividends at the end of each of the next two years. Thereafter, the dividend will grow at a constant annual rate of 4 percent forever. The current stock price is $61. What is next year's dividend payment if the required rate of return is 9.8 percent?

27. **Finding the Required Return** Juggernaut Satellite Corporation earned $24.5 million for the fiscal year ending yesterday. The firm also paid out 30 percent of its earnings as dividends yesterday. The firm will continue to pay out 30 percent of its earnings as annual, end-of-year dividends. The remaining 70 percent of earnings is retained by the company for use in projects. The company has 2.5 million shares of common stock outstanding. The current stock price is $104. The historical return on equity (ROE) of 13 percent is expected to continue in the future. What is the required rate of return on the stock?

28. **Dividend Growth** Four years ago, Bling Diamond, Inc., paid a dividend of $1.73 per share. The firm paid a dividend of $2.36 per share yesterday. Dividends will grow over the next five years at the same