CRITICAL THINKING AND CONCEPTS REVIEW

4.1 **Present Value.** The basic present value equation has four parts. What are they?

4.2 **Compounding.** What is compounding? What is discounting?

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

4.4 **Compounding and Interest Rates.** What happens to a future value if you increase the rate r? What happens to a present value?

4.5 **Ethical Considerations.** Take a look back at Example 4.6. Is it deceptive advertising? Is it unethical to advertise a future value like this without a disclaimer?

To answer the next five questions, refer to the GMAC security we discussed to open the chapter.

4.6 **Time Value of Money.** Why would GMAC be willing to accept such a small amount today ($500) in exchange for a promise to repay 20 times that amount ($10,000) in the future?

4.7 **Call Provisions.** GMAC has the right to buy back the securities anytime it wishes by paying $10,000 (this is a term of this particular deal). What impact does this feature have on the desirability of this security as an investment?

4.8 **Time Value of Money.** Would you be willing to pay $500 today in exchange for $10,000 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?

4.9 **Investment Comparison.** Suppose that when GMAC offered the security for $500, the U.S. Treasury had offered an essentially identical security. Do you think it would have had a higher or lower price? Why?

4.10 **Length of Investment.** The GMAC security is actively bought and sold on the New York Stock Exchange. If you looked in *The Wall Street Journal* today, do you think the price would exceed the $500 original price? Why? If you looked in the year 2006, do you think the price would be higher or lower than today's price? Why?

QUESTIONS AND PROBLEMS

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Spreadsheet Templates 3, 4, 15, 18

Basic
(Questions 1–15)

1. **Simple Interest versus Compound Interest.** First Mark Bank pays 6 percent simple interest on its savings account balances, whereas First Mullineaux Bank pays 6 percent interest compounded annually. If you made a $5,000 deposit in each bank, how much more money would you earn from your First Mullineaux Bank account at the end of 10 years?

2. **Calculating Future Values.** For each of the following, compute the future value:

Present Value	Years	Interest Rate	Future Value
$ 2,250	3	18%	
9,310	10	6	
81,550	17	12	
210,384	22	7	

3. **Calculating Present Values.** For each of the following, compute the present value:

Present Value	Years	Interest Rate	Future Value
	4	4%	$ 15,451
	9	12	51,557
	14	22	886,073
	18	20	550,164

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

Present Value	Years	Interest Rate	Future Value
$ 221	4		$ 307
425	8		761
25,000	16		136,771
40,200	25		255,810

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
$ 250		4%	$ 1,105
1,941		9	3,860
21,320		23	387,120
32,500		34	198,212

6. **Calculating Interest Rates.** Assume the total cost of a college education will be $300,000 when your child enters college in 18 years. You presently have $40,000 to invest. What annual rate of interest must you earn on your investment to cover the cost of your child's college education?

7. **Calculating the Number of Periods.** At 9 percent interest, how long does it take to double your money? To quadruple it?

8. **Calculating Interest Rates.** You are offered an investment that requires you to put up $10,000 today in exchange for $40,000 15 years from now. What is the annual rate of return on this investment?

9. **Calculating the Number of Periods.** You're trying to save to buy a new $120,000 Ferrari. You have $26,000 today that can be invested at your bank. The bank pays 3.5 percent annual interest on its accounts. How long will it be before you have enough to buy the car?

10. **Calculating Present Values.** Imprudential, Inc., has an unfunded pension liability of $950 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 8 percent, what is the present value of this liability?

11. **Calculating Present Values.** You have just received notification that you have won the $2 million first prize in the Centennial Lottery. However, the prize will be awarded on your 100th birthday (assuming you're around to collect), 80 years from

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

5.4 **Present Value.** The Tri-State Megabucks lottery advertises a $500,000 prize; however, the lump-sum option is $250,000. Is this deceptive advertising?

5.5 **Present Value.** If you were an athlete negotiating a contract, would you want a big signing bonus payable immediately and smaller payments in the future, or vice versa? How about looking at it from the team's perspective?

5.6 **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?

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

5.8 **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.

5.9 **Time Value.** In words, how would you go about valuing the subsidy on a subsidized Stafford loan?

5.10 **Time Value.** Eligibility for a subsidized Stafford loan is based on current financial need. However, both subsidized and unsubsidized Stafford loans are repaid out of future income. Given this, do you see a possible objection to having two types?

QUESTIONS AND PROBLEMS

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Spreadsheet Templates 3, 4, 7, 31

Basic
(Questions 1–28)

1. **Present Value and Multiple Cash Flows.** JD Shaved Ice Co. has identified an investment project with the following cash flows. If the discount rate is 10 percent, what is the present value of these cash flows? What is the present value at 18 percent? At 24 percent?

Year	Cash Flow
1	$ 700
2	300
3	1,200
4	1,600

2. **Present Value and Multiple Cash Flows.** Investment X offers to pay you $4,000 per year for 10 years, whereas Investment Y offers to pay you $8,000 per year for 4 years. Which of these cash flow streams has the higher present value if the discount rate is 5 percent? If the discount rate is 15 percent?

3. **Future Value and Multiple Cash Flows.** Officer, Inc., has identified an investment project with the following cash flows. If the discount rate is 8 percent,

continued on next page

what is the future value of these cash flows in Year 4? What is the future value at a discount rate of 11 percent? At 24 percent?

Year	Cash Flow
1	$ 500
2	900
3	1,100
4	1,300

4. **Calculating Annuity Present Value.** An investment offers $6,000 per year for 15 years, with the first payment occurring 1 year from now. If the required return is 8 percent, what is the value of the investment? What would the value be if the payments occurred for 40 years? For 75 years? Forever?
5. **Calculating Annuity Cash Flows.** If you put up $10,000 today in exchange for a 9.5 percent, 12-year annuity, what will the annual cash flow be?
6. **Calculating Annuity Values.** Your company will generate $50,000 in revenue each year for the next eight years from a new information database. The computer system needed to set up the database costs $250,000. If you can borrow the money to buy the computer system at 8.75 percent annual interest, can you afford the new system?
7. **Calculating Annuity Values.** If you deposit $2,000 at the end of each of the next 20 years into an account paying 7.5 percent interest, how much money will you have in the account in 20 years? How much will you have if you make deposits for 40 years?
8. **Calculating Annuity Values.** You want to have $50,000 in your savings account seven years from now, and you're prepared to make equal annual deposits into the account at the end of each year. If the account pays 3.75 percent interest, what amount must you deposit each year?
9. **Calculating Annuity Values.** Biktimirov's Bank offers you a $20,000, seven-year term loan at 11 percent annual interest. What will your annual loan payment be?
10. **Calculating Perpetuity Values.** Moe's Life Insurance Co. is trying to sell you an investment policy that will pay you and your heirs $10,000 per year forever. If the required return on this investment is 9 percent, how much will you pay for the policy?
11. **Calculating Perpetuity Values.** In the previous problem, suppose Moe's told you the policy costs $120,000. At what interest rate would this be a fair deal?
12. **Calculating EAR.** Find the EAR in each of the following cases:

Stated Rate (APR)	Number of Times Compounded	Effective Rate (EAR)
7%	Quarterly	
9	Monthly	
12	Daily	
16	Semiannually	

13. **Calculating APR.** Find the APR, or stated rate, in each of the following cases:

Stated Rate (APR)	Number of Times Compounded	Effective Rate (EAR)
	Semiannually	9%
	Monthly	19
	Weekly	8
	Daily	15

14. **Calculating EAR.** First National Bank charges 12.6 percent compounded monthly on its business loans. First United Bank charges 12.8 percent compounded semiannually. As a potential borrower, which bank would you go to for a new loan?
15. **Calculating APR.** Buckeye Credit Corp. wants to earn an effective annual return on its consumer loans of 16 percent per year. The bank uses daily compounding on its loans. What interest rate is the bank required by law to report to potential borrowers? Explain why this rate is misleading to an uninformed borrower.
16. **Calculating Future Values.** What is the future value of $1,420 in 12 years assuming an interest rate of 10 percent compounded semiannually?
17. **Calculating Future Values.** Lowpay Credit Bank is offering 2.6 percent compounded daily on its savings accounts. If you deposit $5,000 today, how much will you have in the account in five years? In 10 years? In 20 years?
18. **Calculating Present Values.** An investment will pay you $60,000 in six years. If the appropriate discount rate is 8 percent compounded daily, what is the present value?
19. **EAR versus APR.** Ricky Ripov's Pawn Shop charges an interest rate of 20 percent per month on loans to its customers. Like all lenders, Ricky must report an APR to consumers. What rate should the shop report? What is the effective annual rate?
20. **Calculating Loan Payments.** You want to buy a new sports coupe for $52,350, and the finance office at the dealership has quoted you an 8.6 percent APR loan for 60 months to buy the car. What will your monthly payments be? What is the effective annual rate on this loan?
21. **Calculating Number of Periods.** One of your customers is delinquent on his accounts payable balance. You've mutually agreed to a repayment schedule of $400 per month. You will charge 1.4 percent per month interest on the overdue balance. If the current balance is $11,652, how long will it take for the account to be paid off?
22. **Calculating EAR.** Friendly's Quick Loans, Inc., offers you "three for four, or I knock on your door." This means you get $3 today and repay $4 when you get your paycheck in one week (or else). What's the effective annual return Friendly's earns on this lending business? If you were brave enough to ask, what APR would Friendly's say you were paying?
23. **Valuing Perpetuities.** Maybepay Life Insurance Co. is selling a perpetual annuity contract that pays $2,000 monthly. The contract currently sells for $130,000. What is the monthly return on this investment vehicle? What is the APR? The effective annual return?
24. **Calculating Annuity Future Values.** You are to make monthly deposits of $200 into a retirement account that pays 11 percent interest compounded monthly. If your first deposit will be made one month from now, how large will your retirement account be in 30 years?

54. **Calculating Future Values.** If today is Year 0, what is the future value of the following cash flows five years from now? What is the future value 10 years from now? Assume a discount rate of 10.2 percent per year.

Year	Cash Flow
2	$30,000
3	45,000
5	75,000

55. **Amortization with Equal Payments.** Prepare an amortization schedule for a three-year loan of $60,000. The interest rate is 11 percent per year, and the loan calls for equal annual payments. How much interest is paid in the third year? How much total interest is paid over the life of the loan?

56. **Amortization with Equal Principal Payments.** Rework Problem 55 assuming that the loan agreement calls for a principal reduction of $20,000 every year instead of equal annual payments.

What's On the Web?

5.1 **Annuity Future Value.** The St. Louis Federal Reserve Board has files listing historical interest rates on their web site www.stls.frb.org. Follow the link for "FRED II® (Federal Reserve Economic Data)." You will find listings for Moody's Seasoned Aaa Corporate Bond Yield and Moody's Seasoned Baa Corporate Bond Yield. (These rates are discussed in the next chapter.) If you invest $2,000 per year for the next 40 years at the most recent Aaa yield, how much will you have? What if you invest the same amount at the Baa yield?

5.2 **Loan Payments.** Finding the time necessary until you pay off a loan is simple if you make equal payments each month. However, when paying off credit cards many individuals only make the minimum monthly payment, which is generally $10 or 2 percent to 3 percent of the balance, whichever is greater. You can find a credit card calculator at www.fincalc.com. You currently owe $10,000 on a credit card with a 17 percent interest rate and a minimum payment of $10 or 2 percent of your balance, whichever is greater. How soon will you pay off this debt if you make the minimum payment each month? How much total interest will you pay?

5.3 **Annuity Payments.** Go to www.fcfcorp.com/onlinecalc.htm. Use the calculator to solve this problem. If you have $1,500,000 when you retire and want to withdraw an equal amount for the next 30 years, how much can you withdraw each year if you earn 7 percent? What if you earn 9 percent?

5.4 **Annuity Payments.** The St. Louis Federal Reserve Board has files listing historical interest rates on their web site www.stls.frb.org. Follow the link for "FRED II® (Federal Reserve Economic Data)." You will find a listing for the Bank Prime Loan Rate. The file lists the monthly prime rate since January 1949 (1949.01). What is the most recent prime rate? What is the highest prime rate over this period? If you bought a house for $150,000 at the current prime rate on a 30-year mortgage with monthly payments, how much are your payments? If you had purchased the house at the same price when the prime rate was at its highest, what would your monthly payments have been?

5.5 **Loan Amortization.** Interest.com, located at www.interest.com, has a financial calculator that will prepare a loan amortization table based on your inputs. First,

13.6 **Homemade Leverage.** What is homemade leverage?

13.7 **Bankruptcy and Corporate Ethics.** As mentioned in the text, some firms have filed for bankruptcy because of actual or likely litigation-related losses. Is this a proper use of the bankruptcy process?

13.8 **Bankruptcy and Corporate Ethics.** Firms sometimes use the threat of a bankruptcy filing to force creditors to renegotiate terms. Critics argue that in such cases, the firm is using bankruptcy laws "as a sword rather than a shield." Is this an ethical tactic?

13.9 **Bankruptcy and Corporate Ethics.** As mentioned in the text, Continental Airlines filed for bankruptcy, at least in part, as a means of reducing labor costs. Whether this move was ethical, or proper, was hotly debated. Give both sides of the argument.

13.10 **Capital Structure Goal.** What is the basic goal of financial management with regard to capital structure?

QUESTIONS AND PROBLEMS

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Spreadsheet Templates 1, 3, 9

Basic
(Questions 1–15)

1. **EBIT and Leverage.** Big Apple, Inc., has no debt outstanding and a total market value of $80,000. Earnings before interest and taxes, EBIT, are projected to be $10,000 if economic conditions are normal. If there is strong expansion in the economy, then EBIT will be 20 percent higher. If there is a recession, then EBIT will be 30 percent lower. Big Apple is considering a $40,000 debt issue with a 5 percent interest rate. The proceeds will be used to repurchase shares of stock. There are currently 4,000 shares outstanding. Ignore taxes for this problem.
   a. Calculate earnings per share, EPS, under each of the three economic scenarios before any debt is issued. Also, calculate the percentage changes in EPS when the economy expands or enters a recession.
   b. Repeat part (*a*) assuming that Big Apple goes through with recapitalization. What do you observe?
2. **EBIT, Taxes, and Leverage.** Repeat parts (*a*) and (*b*) in Problem 1 assuming Big Apple has a tax rate of 35 percent.
3. **ROE and Leverage.** Suppose the company in Problem 1 has a market-to-book ratio of 1.0.
   a. Calculate return on equity, ROE, under each of the three economic scenarios before any debt is issued. Also, calculate the percentage changes in ROE for economic expansion and recession, assuming no taxes.
   b. Repeat part (*a*) assuming the firm goes through with the proposed recapitalization.
   c. Repeat parts (*a*) and (*b*) of this problem assuming the firm has a tax rate of 35 percent.
4. **Break-Even EBIT.** Duval Corporation is comparing two different capital structures, an all-equity plan (Plan I) and a levered plan (Plan II). Under Plan I, Duval would have 600,000 shares of stock outstanding. Under Plan II, there would be 300,000 shares of stock outstanding and $10 million in debt outstanding. The interest rate on the debt is 10 percent, and there are no taxes.
   a. If EBIT is $1.5 million, which plan will result in the higher EPS?

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b. If EBIT is $11 million, which plan will result in the higher EPS?

c. What is the break-even EBIT?

5. **M&M and Stock Value.** In Problem 4, use M&M Proposition I to find the price per share of equity under each of the two proposed plans. What is the value of the firm?

6. **Break-Even EBIT and Leverage.** Hoobastank Co. is comparing two different capital structures. Plan I would result in 1,000 shares of stock and $30,000 in debt. Plan II would result in 2,000 shares of stock and $15,000 in debt. The interest rate on the debt is 10 percent.

   a. Ignoring taxes, compare both of these plans to an all-equity plan assuming that EBIT will be $12,000. The all-equity plan would result in 3,000 shares of stock outstanding. Which of the three plans has the highest EPS? The lowest?

   b. In part (*a*), what are the break-even levels of EBIT for each plan as compared to that for an all-equity plan? Is one higher than the other? Why?

   c. Ignoring taxes, when will EPS be identical for Plans I and II?

   d. Repeat parts (*a*), (*b*), and (*c*) assuming that the corporate tax rate is 38 percent. Are the break-even levels of EBIT different from before? Why or why not?

7. **Leverage and Stock Value.** Ignoring taxes in Problem 6, what is the price per share of equity under Plan I? Plan II? What principle is illustrated by your answers?

8. **Homemade Leverage.** Ozone Depletion, Inc., a prominent consumer products firm, is debating whether or not to convert its all-equity capital structure to one that is 30 percent debt. Currently, there are 800 shares outstanding and the price per share is $80. EBIT is expected to remain at $6,000 per year forever. The interest rate on new debt is 9 percent, and there are no taxes.

   a. Rico, a shareholder of the firm, owns 100 shares of stock. What is his cash flow under the current capital structure, assuming the firm has a dividend payout rate of 100 percent?

   b. What will Rico's cash flow be under the proposed capital structure of the firm? Assume that he keeps all 100 of his shares.

   c. Suppose Ozone does convert, but Rico prefers the current all-equity capital structure. Show how he could unlever his shares of stock to recreate the original capital structure.

   d. Using your answer to part (*c*), explain why Ozone's choice of capital structure is irrelevant.

9. **Homemade Leverage.** Buffett Enterprises is considering a change from its current capital structure. Buffett currently has an all-equity capital structure and is considering a capital structure with 40 percent debt. There are currently 1,000 shares outstanding at a price per share of $120. EBIT is expected to remain constant at $38,000. The interest rate on new debt is 8 percent and there are no taxes.

   a. Rebecca owns $12,000 worth of stock in the company. If the firm has a 100 percent payout, what is her cash flow?

   b. What would her cash flow be under the new capital structure assuming that she keeps all of her shares?

   c. Suppose the company does convert to the new capital structure. Show how Rebecca can maintain her current cash flow.

   d. Under your answer to part (*c*), explain why Buffett's choice of capital structure is irrelevant.