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

Present Value	Years	Interest Rate	Future Value
$ 242	4		$ 307
410	8		896
51,700	16		162,181
18,750	27		483,500

20. **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. **Calculating Annuities** You are planning to save for retirement over the next 30 years. To do this, you will invest $800 a month in a stock account and $350 a month in a bond account. The return of the stock account is expected to be 11 percent, and the bond account will pay 6 percent. When you retire, you will combine your money into an account with an 8 percent return. How much can you withdraw each month from your account assuming a 25-year withdrawal period?

26. **Growing Perpetuities** Mark Weinstein has been working on an advanced technology in laser eye surgery. His technology will be available in the near term. He anticipates his first annual cash flow from the technology to be $175,000, received two years from today. Subsequent annual cash flows will grow at 3.5 percent in perpetuity. What is the present value of the technology if the discount rate is 10 percent?

27. **Perpetuities** A prestigious investment bank designed a new security that pays a quarterly dividend of $4.50 in perpetuity. The first dividend occurs one quarter from today. What is the price of the security if the stated annual interest rate is 6.5 percent, compounded quarterly?

28. **Annuity Present Values** What is the present value of an annuity of $6,500 per year, with the first cash flow received three years from today and the last one received 25 years from today? Use a discount rate of 7 percent.

29. **Annuity Present Values** What is the value today of a 15-year annuity that pays $650 a year? The annuity's first payment occurs six years from today. The annual interest rate is 11 percent for Years 1 through 5, and 13 percent thereafter.

30. **Balloon Payments** Audrey Sanborn has just arranged to purchase a $550,000 vacation home in the Bahamas with a 20 percent down payment. The mortgage has a 6.1 percent stated annual interest rate, compounded monthly, and calls for equal monthly payments over the next 30 years. Her first payment will be due one month from now. However, the mortgage has an eight-year balloon payment, meaning that the balance of the loan must be paid off at the end of Year 8. There were no other transaction costs or finance charges. How much will Audrey's balloon payment be in eight years?

keeping or rejecting the project?

33. Growing Annuity Southern California Publishing Company is trying to decide whether to revise its popular textbook, *Financial Psychoanalysis Made Simple.* The company has estimated that the revision will cost $75,000. Cash flows from increased sales will be $21,000 the first year. These cash flows will increase by 4 percent per year. The book will go out of print five years from now. Assume that the initial cost is paid now and revenues are received at the end of each year. If the company requires a return of 10 percent for such an investment, should it undertake the revision?

38. Calculating Loan Payments You need a 30-year, fixed-rate mortgage to buy a new home for $250,000. Your mortgage bank will lend you the money at a 5.3 percent APR for this 360-month loan. However, you can only afford monthly payments of $950, so you offer to pay off any remaining loan balance at the end of the loan in the form of a single balloon payment. How large will this balloon payment have to be for you to keep your monthly payments at $950?

44. Variable Interest Rates A 15-year annuity pays $1,500 per month, and payments are made at the end of each month. If the interest rate is 12 percent compounded monthly for the first seven years, and 6 percent compounded monthly thereafter, what is the present value of the annuity?

45. Comparing Cash Flow Streams You have your choice of two investment accounts. Investment A is a 15-year annuity that features end-of-month $1,500 payments and has an interest rate of 8.7 percent compounded monthly. Investment B is an 8 percent continuously compounded lump-sum investment, also good for 15 years. How much money would you need to invest in B today for it to be worth as much as Investment A 15 years from now?

46. Calculating Present Value of a Perpetuity Given an interest rate of 6.1 percent per year, what is the value at Date $t = 7$ of a perpetual stream of $2,500 annual payments that begins at Date $t = 15$?

47. Calculating EAR A local finance company quotes a 16 percent interest rate on one-year loans. So, if you borrow $26,000, the interest for the year will be $4,160. Because you must repay a total of $30,160 in one year, the finance company requires you to pay $30,160/12, or $2,513.33, per month over the next 12 months. Is this a 15 percent loan? What rate would legally have to be quoted? What is the effective annual rate?

48. Calculating Present Values A 5-year annuity of ten $5,300 semiannual payments will begin 9 years from now, with the first payment coming 9.5 years from now. If the discount rate is 12 percent compounded monthly, what is the value of this annuity five years from now? What is the value three years from now? What is the current value of the annuity?

50. Calculating Annuities Due You want to buy a new sports car from Muscle Motors for $73,000. The contract is in the form of a 60-month annuity due at a 6.45 percent APR. What will your monthly payment be?

51. Calculating Annuities Due You want to lease a set of golf clubs from Pings Ltd. The lease contract is in the form of 24 equal monthly payments at a 10.4 percent stated annual interest rate, compounded monthly. Because the clubs cost $2,300 retail, Pings wants the PV of the lease payments to equal $2,300. Suppose that your first payment is due immediately. What will your monthly lease payments be?

53. Growing Annuities Tom Adams has received a job offer from a large investment bank as a clerk to an associate banker. His base salary will be $55,000. He will receive his first annual salary payment one year from the day he begins to work. In addition, he will get an immediate $10,000 bonus for joining the company. His salary will grow at 3.5 percent each year. Each year he will receive a bonus equal to 10 percent of his salary. Mr. Adams is expected to work for 25 years. What is the present value of the offer if the discount rate is 9 percent?

56. Balloon Payments On September 1, 2009, Susan Chao bought a motorcycle for $30,000. She paid $1,000 down and financed the balance with a five-year loan at a stated annual interest rate of 7.2 percent, compounded monthly. She started the monthly payments exactly one month after the purchase (i.e., October 1, 2009). Two years later, at the end of October 2011, Susan got a new job and decided to pay off the loan. If the bank charges her a 1 percent prepayment penalty based on the loan balance, how much must she pay the bank on November 1, 2011?

59. Calculating Annuity Values An All-Pro defensive lineman is in contract negotiations. The team has offered the following salary structure:

Time	Salary
0	$8,500,000
1	3,900,000
2	4,600,000
3	5,300,000
4	5,800,000
5	6,400,000
6	7,300,000

All salaries are to be paid in a lump sum. The player has asked you as his agent to renegotiate the terms. He wants a $10 million signing bonus payable today and a contract value increase of $1,500,000. He also wants an equal salary paid every three months, with the first paycheck three months from now. If the interest rate is 5 percent compounded daily, what is the amount of his quarterly check? Assume 365 days in a year.

60. Discount Interest Loans This question illustrates what is known as *discount interest*. Imagine you are discussing a loan with a somewhat unscrupulous lender. You want to borrow $20,000 for one year. The interest rate is 15 percent. You and the lender agree that the interest on the loan will be .15 × $20,000 = $3,000. So, the lender deducts this interest amount from the loan up front and gives you $17,000. In this case, we say that the discount is $3,000. What's wrong here?