

- 5-20 PV OF A CASH FLOW STREAM** A rookie quarterback is negotiating his first NFL contract. His opportunity cost is 10%. He has been offered three possible 4-year contracts. Payments are guaranteed, and they would be made at the end of each year. Terms of each contract are as follows:

	1	2	3	4
Contract 1	\$3,000,000	\$3,000,000	\$3,000,000	\$3,000,000
Contract 2	\$2,000,000	\$3,000,000	\$4,000,000	\$5,000,000
Contract 3	\$7,000,000	\$1,000,000	\$1,000,000	\$1,000,000

As his adviser, which contract would you recommend that he accept?

- 5-21 EVALUATING LUMP SUMS AND ANNUITIES** Crissie just won the lottery, and she must choose between three award options. She can elect to receive a lump sum today of \$61 million, to receive 10 end-of-year payments of \$9.5 million, or to receive 30 end-of-year payments of \$5.5 million.

- If she thinks she can earn 7% annually, which should she choose?
- If she expects to earn 8% annually, which is the best choice?
- If she expects to earn 9% annually, which option would you recommend?
- Explain how interest rates influence the optimal choice.

- 5-22 LOAN AMORTIZATION** Jan sold her house on December 31 and took a \$10,000 mortgage as part of the payment. The 10-year mortgage has a 10% nominal interest rate, but it calls for semiannual payments beginning next June 30. Next year Jan must report on Schedule B of her IRS Form 1040 the amount of interest that was included in the two payments she received during the year.

- What is the dollar amount of each payment Jan receives?
- How much interest was included in the first payment? How much repayment of principal was included? How do these values change for the second payment?
- How much interest must Jan report on Schedule B for the first year? Will her interest income be the same next year?
- If the payments are constant, why does the amount of interest income change over time?

- 5-23 FUTURE VALUE FOR VARIOUS COMPOUNDING PERIODS** Find the amount to which \$500 will grow under each of these conditions:

- 12% compounded annually for 5 years
- 12% compounded semiannually for 5 years
- 12% compounded quarterly for 5 years
- 12% compounded monthly for 5 years
- 12% compounded daily for 5 years
- Why does the observed pattern of FVs occur?

- 5-24 PRESENT VALUE FOR VARIOUS DISCOUNTING PERIODS** Find the present value of \$500 due in the future under each of these conditions:

- 12% nominal rate, semiannual compounding, discounted back 5 years
- 12% nominal rate, quarterly compounding, discounted back 5 years
- 12% nominal rate, monthly compounding, discounted back 1 year
- Why do the differences in the PVs occur?

- 5-25 FUTURE VALUE OF AN ANNUITY** Find the future values of the following ordinary annuities:

- FV of \$400 paid each 6 months for 5 years at a nominal rate of 12% compounded semiannually
- FV of \$200 paid each 3 months for 5 years at a nominal rate of 12% compounded quarterly
- These annuities receive the same amount of cash during the 5-year period and earn interest at the same nominal rate, yet the annuity in Part b ends up larger than the one in Part a. Why does this occur?

- 5-26 PV AND LOAN ELIGIBILITY** You have saved \$4,000 for a down payment on a new car. The largest monthly payment you can afford is \$350. The loan will have a 12% APR based on end-of-month payments. What is the most expensive car you can afford if you finance it for 48 months? for 60 months?

Challenging  
Problems  
27-40

- 5-27 **EFFECTIVE VERSUS NOMINAL INTEREST RATES** Bank A pays 4% interest compounded annually on deposits, while Bank B pays 3.5% compounded daily.
- Based on the EAR (or EFF%), which bank should you use?
  - Could your choice of banks be influenced by the fact that you might want to withdraw your funds during the year as opposed to at the end of the year? Assume that your funds must be left on deposit during an entire compounding period in order to receive any interest.
- 5-28 **NOMINAL INTEREST RATE AND EXTENDING CREDIT** As a jewelry store manager, you want to offer credit, with interest on outstanding balances paid monthly. To carry receivables, you must borrow funds from your bank at a nominal 6%, monthly compounding. To offset your overhead, you want to charge your customers an EAR (or EFF%) that is 2% more than the bank is charging you. What APR rate should you charge your customers?
- 5-29 **BUILDING CREDIT COST INTO PRICES** Your firm sells for cash only; but it is thinking of offering credit, allowing customers 90 days to pay. Customers understand the time value of money, so they would all wait and pay on the 90th day. To carry these receivables, you would have to borrow funds from your bank at a nominal 12%, daily compounding based on a 360-day year. You want to increase your base prices by exactly enough to offset your bank interest cost. To the closest whole percentage point, by how much should you raise your product prices?
- 5-30 **REACHING A FINANCIAL GOAL** Erika and Kitty, who are twins, just received \$30,000 each for their 25th birthday. They both have aspirations to become millionaires. Each plans to make a \$5,000 annual contribution to her "early retirement fund" on her birthday, beginning a year from today. Erika opened an account with the Safety First Bond Fund, a mutual fund that invests in high-quality bonds whose investors have earned 6% per year in the past. Kitty invested in the New Issue Bio-Tech Fund, which invests in small, newly issued bio-tech stocks and whose investors have earned an average of 20% per year in the fund's relatively short history.
- If the two women's funds earn the same returns in the future as in the past, how old will each be when she becomes a millionaire?
  - How large would Erika's annual contributions have to be for her to become a millionaire at the same age as Kitty, assuming their expected returns are realized?
  - Is it rational or irrational for Erika to invest in the bond fund rather than in stocks?
- 5-31 **REQUIRED LUMP SUM PAYMENT** Starting next year, you will need \$10,000 annually for 4 years to complete your education. (One year from today you will withdraw the first \$10,000.) Your uncle deposits an amount *today* in a bank paying 5% annual interest, which will provide the needed \$10,000 payments.
- How large must the deposit be?
  - How much will be in the account immediately after you make the first withdrawal?
- 5-32 **REACHING A FINANCIAL GOAL** Six years from today you need \$10,000. You plan to deposit \$1,500 annually, with the first payment to be made a year from today, in an account that pays an 8% effective annual rate. Your last deposit, which will occur at the end of Year 6, will be for less than \$1,500 if less is needed to reach \$10,000. How large will your last payment be?
- 5-33 **FV OF UNEVEN CASH FLOW** You want to buy a house within 3 years, and you are currently saving for the down payment. You plan to save \$5,000 at the end of the first year, and you anticipate that your annual savings will increase by 10% annually thereafter. Your expected annual return is 7%. How much will you have for a down payment at the end of Year 3?
- 5-34 **AMORTIZATION SCHEDULE**
- Set up an amortization schedule for a \$25,000 loan to be repaid in equal installments at the end of each of the next 3 years. The interest rate is 10% compounded annually.
  - What percentage of the payment represents interest and what percentage represents principal for each of the 3 years? Why do these percentages change over time?
- 5-35 **AMORTIZATION SCHEDULE WITH A BALLOON PAYMENT** You want to buy a house that costs \$100,000. You have \$10,000 for a down payment, but your credit is such that mortgage companies will not lend you the required \$90,000. However, the realtor persuades the seller to take a \$90,000 mortgage (called a seller take-back mortgage) at a rate of 7%, provided the loan is paid off in full in 3 years. You expect to inherit \$100,000 in 3 years; but right now all you have is \$10,000, and you can afford to make payments of no more