

**(4-1)**  
Future Value of a  
Single Payment

If you deposit \$10,000 in a bank account that pays 10% interest annually, how much will be in your account after 5 years?

**(4-2)**  
Present Value of a  
Single Payment

What is the present value of a security that will pay \$5,000 in 20 years if securities of equal risk pay 7% annually?

**(4-3)**  
Interest Rate on a  
Single Payment

Your parents will retire in 18 years. They currently have \$250,000, and they think they will need \$1 million at retirement. What annual interest rate must they earn to reach their goal, assuming they don't save any additional funds?

**(4-4)**  
Number of Periods of  
a Single Payment

If you deposit money today in an account that pays 6.5% annual interest, how long will it take to double your money?

**(4-5)**  
Number of Periods  
for an Annuity

You have \$42,180.53 in a brokerage account, and you plan to deposit an additional \$5,000 at the end of every future year until your account totals \$250,000. You expect to earn 12% annually on the account. How many years will it take to reach your goal?

**(4-6)**  
Future Value: Ordin-  
ary Annuity versus  
Annuity Due

What is the future value of a 7%, 5-year ordinary annuity that pays \$300 each year? If this were an annuity due, what would its future value be?

**(4-7)**  
Present and Future  
Value of an Uneven  
Cash Flow Stream

An investment will pay \$100 at the end of each of the next 3 years, \$200 at the end of Year 4, \$300 at the end of Year 5, and \$500 at the end of Year 6. If other investments of equal risk earn 8% annually, what is this investment's present value? Its future value?

**(4-8)**  
Annuity Payment  
and EAR

You want to buy a car, and a local bank will lend you \$20,000. The loan would be fully amortized over 5 years (60 months), and the nominal interest rate would be 12% with interest paid monthly. What is the monthly loan payment? What is the loan's EFF%?

(4-35)

Build a Model: The  
Time Value of  
Money

resource

Start with the partial model in the file *Ch04 P35 Build a Model.xlsx* from the textbook's Web site. Answer the following questions, using the spreadsheet model to do the calculations.

- a. Find the FV of \$1,000 invested to earn 10% annually 5 years from now. Answer this question first by using a math formula and then by using the *Excel* function wizard.
- b. Now create a table that shows the FV at 0%, 5%, and 20% for 0, 1, 2, 3, 4, and 5 years. Then create a graph with years on the horizontal axis and FV on the vertical axis to display your results.
- c. Find the PV of \$1,000 due in 5 years if the discount rate is 10% per year. Again, first work the problem with a formula and then by using the function wizard.
- d. A security has a cost of \$1,000 and will return \$2,000 after 5 years. What rate of return does the security provide?
- e. Suppose California's population is 30 million people and its population is expected to grow by 2% per year. How long would it take for the population to double?
- f. Find the PV of an ordinary annuity that pays \$1,000 at the end of each of the next 5 years if the interest rate is 15%. Then find the FV of that same annuity.
- g. How would the PV and FV of the above annuity change if it were an annuity due rather than an ordinary annuity?
- h. What would the FV and PV for parts a and c be if the interest rate were 10% with *semiannual* compounding rather than 10% with *annual* compounding?
- i. Find the PV and FV of an investment that makes the following end-of-year payments. The interest rate is 8%.

<u>Year</u>	<u>Payment</u>
1	\$100
2	200
3	400

- j. Suppose you bought a house and took out a mortgage for \$50,000. The interest rate is 8%, and you must amortize the loan over 10 years with equal end-of-year payments. Set up an amortization schedule that shows the annual payments and the amount of each payment that repays the principal and the amount that constitutes interest expense to the borrower and interest income to the lender.
  - (1) Create a graph that shows how the payments are divided between interest and principal repayment over time.
  - (2) Suppose the loan called for 10 years of monthly payments, 120 payments in all, with the same original amount and the same nominal interest rate. What would the amortization schedule show now?

(5-24)

Build a Model: Bond  
Valuation

resource

Start with the partial model in the file *Ch05 P24 Build a Model.xlsx* on the textbook's Web site. A 20-year, 8% semiannual coupon bond with a par value of \$1,000 may be called in 5 years at a call price of \$1,040. The bond sells for \$1,100. (Assume that the bond has just been issued.)

- a. What is the bond's yield to maturity?
- b. What is the bond's current yield?
- c. What is the bond's capital gain or loss yield?
- d. What is the bond's yield to call?
- e. How would the price of the bond be affected by a change in the going market interest rate? (*Hint: Conduct a sensitivity analysis of price to changes in the going market interest rate for the bond. Assume that the bond will be called if and only if the going rate of interest falls below the coupon rate. This is an oversimplification, but assume it for purposes of this problem.*)
- f. Now assume the date is October 25, 2017. Assume further that a 12%, 10-year bond was issued on July 1, 2017, pays interest semiannually (on January 1 and July 1), and sells for \$1,100. Use your spreadsheet to find the bond's yield.