2-5 Compound Interest Formula

Advanced Financial Algebra

What is compound interest?

- Remember description and examples from Section 2-4.
- Compound interest means that you are paid interest on your balance AND on previous interest you have earned.
- Compound interest allows your money to grow FASTER!

Developing formula

- Start with % increase and decrease formula: A = P(1 +) = Principal (1 +)
- r is the interest rate, but we must divide it into periods depending upon how frequent compounding occurs: r = %/(# of compounds per year, n) written as a decimal
- **Periodic compounding formula** (not just yearly/annual): **A = P(+ –)( )**

A = amount $ after time P = Principal (original $) r = rate as a decimal

n = number of compounds per year t = time in years

Example 1 – quarterly compounding using formula

- Jose opens a savings account with principal *P* dollars that pays 2% interest, compounded quarterly. What will his ending balance be after 1 year?

- SOLUTION:

- Use the formula: $A = P(1 + \frac{r}{n})^{(n*t)} = P(1 + \frac{.02}{4})^{(4*1)} = \mathbf{P}(\ .\ \ )(\ )$

Example 2 – daily compounding using formula

- If you deposit *P* dollars for 1 year at 2.3% compounded daily, express the ending balance algebraically.

- SOLUTION:

- Use the formula with r = 2.3% as a decimal = .023 and n = 365 for daily:

- $A = P(1 + -)^{(\quad)} = P(1 + \frac{.023}{365})^{(365 * 1)} = \mathbf{P}(\; . \qquad)^{(\quad)}$

Example 3 – daily compounding given Principal

- Marie deposits $1,650 for 3 years at 1% interest, compounded daily. What is her ending balance?

- SOLUTION:

- Use the formula with P = $1.650, r = 1% as a decimal = .01, n = 365 for daily, and t = 3 years:

- A = $P(1 + -)(\quad) = 1650(1 + \frac{.01}{365})^{(365 * 3)} =$ **$1,700.25 after three years**

Assignment: pg 100 #3-6, 8, 11, 13

- #3 On Olga's 16th birthday, her uncle invested $2,000 in an account that was locked into a 1.75% interest rate, compounded monthly. How much will Olga have in the account when she turns 18? Round to the nearest cent.
- #4 Samantha deposits $1,500 into the Park Street Bank. The account pays 1.12% annual interest, compounded daily. To the nearest cent, how much is in the account at the end of three non-leap years?
- #5 Joanne deposits $4,300 into a one-year CD at a rate of 2.3%, compounded daily.

  What is her ending balance after the year?

  How much interest does she earn?

  What is her annual percentage yield to the nearest hundredth of a percent?

Assignment: pg 100 #3-6, 8, 11, 13 continued

- #6 Mike deposits $5,000 in a three-year CD account that yields 1.5% interest, compounded weekly. What is his ending balance at the end of three years? _____

- #8 How much more does $1,000 earn in eight years, compounded daily at 3%, than $1,000 over eight years at 3%, compounded semiannually?

- #11 Lindsay invests $80 in an account that pays 1% annual interest, compounded monthly. Michele invests $60 in an account that pays 2% annual interest, compounded weekly.

  Whose balance is greater after one year? _____ ▼

  Whose balance is greater after twelve years? _____ ▼

- #13 Rodney invests a sum of money, P, into an account that earns interest at a rate of r, compounded yearly. Gerald invests half that amount P/2 into an account that pays twice Rodney's interest rate 2r. Which of the accounts will have the higher ending balance after 1 year? Explain.