Key Concepts and Skills
- Be able to compute the future value of multiple cash flows
- Be able to compute the present value of multiple cash flows
- Be able to compute loan payments
- Be able to find the interest rate on a loan
- Understand how interest rates are quoted
- Understand how loans are amortized or paid off

Chapter Outline
- Future and Present Values of Multiple Cash Flows
- Valuing Level Cash Flows: Annuities and Perpetuities
- Comparing Rates: The Effect of Compounding
- Loan Types and Loan Amortization

Annuities and Perpetuities Defined
- Annuity – finite series of equal payments that occur at regular intervals
  - If the first payment occurs at the end of the period, it is called an ordinary annuity
  - If the first payment occurs at the beginning of the period, it is called an annuity due
- Perpetuity – infinite series of equal payments

Annuities and Perpetuities – Basic Formulas
- Perpetuity: $PV = \frac{C}{r}$
- Annuities:
  - $PV = C \left[ \frac{1 - \frac{1}{(1 + r)^t}}{r} \right]$
  - $FV = C \left[ \frac{1}{r} \right] \left[ \frac{1 - \frac{1}{(1 + r)^t}}{r} \right]$

Annuity Due
- You are saving for a new house and you put $10,000 per year in an account paying 8%. The first payment is made today. How much will you have at the end of 3 years?
  - 2nd BGN 2nd Set (you should see BGN in the display)
  - 3 N
  - -10,000 PMT
  - 8 I/Y
  - CPT FV = 35,061.12
  - 2nd BGN 2nd Set (be sure to change it back to an ordinary annuity)
Table 6.2

Effective Annual Rate (EAR)
- This is the actual rate paid (or received) after accounting for compounding that occurs during the year.
- If you want to compare two alternative investments with different compounding periods, you need to compute the EAR and use that for comparison.

Annual Percentage Rate
- This is the annual rate that is quoted by law.
- By definition, APR = period rate times the number of periods per year.
- Consequently, to get the period rate we rearrange the APR equation:
  - Period rate = APR / number of periods per year.
- You should NEVER divide the effective rate by the number of periods per year; it will NOT give you the period rate.

Computing APRs
- What is the APR if the monthly rate is .5%?
  - .5(12) = 6%
- What is the APR if the semiannual rate is .5%?
  - .5(2) = 1%
- What is the monthly rate if the APR is 12% with monthly compounding?
  - 12 / 12 = 1%

Things to Remember
- You ALWAYS need to make sure that the interest rate and the time period match.
  - If you are looking at annual periods, you need an annual rate.
  - If you are looking at monthly periods, you need a monthly rate.
- If you have an APR based on monthly compounding, you need to use monthly periods for lump sums, or adjust the interest rate appropriately if you have payments other than monthly.

Hints on Solving Time Value of Money Problems
- Draw a Time Line
- Begin with the End in Mind
- Watch the Signs of the Cash Flows
- The Number of Periods (N) usually equals the greater of the number of Cash Flows or the Number of Years.
- Always use either the Effective Annual or the Periodic Interest Rate.
- Recognize hidden Perpetuities, Annuities, and Annuities Due.
- Set up the Calculator correctly and always Clear the Calculator before starting a problem.
- Use the course webpage.
- Practice.
Contact Information

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