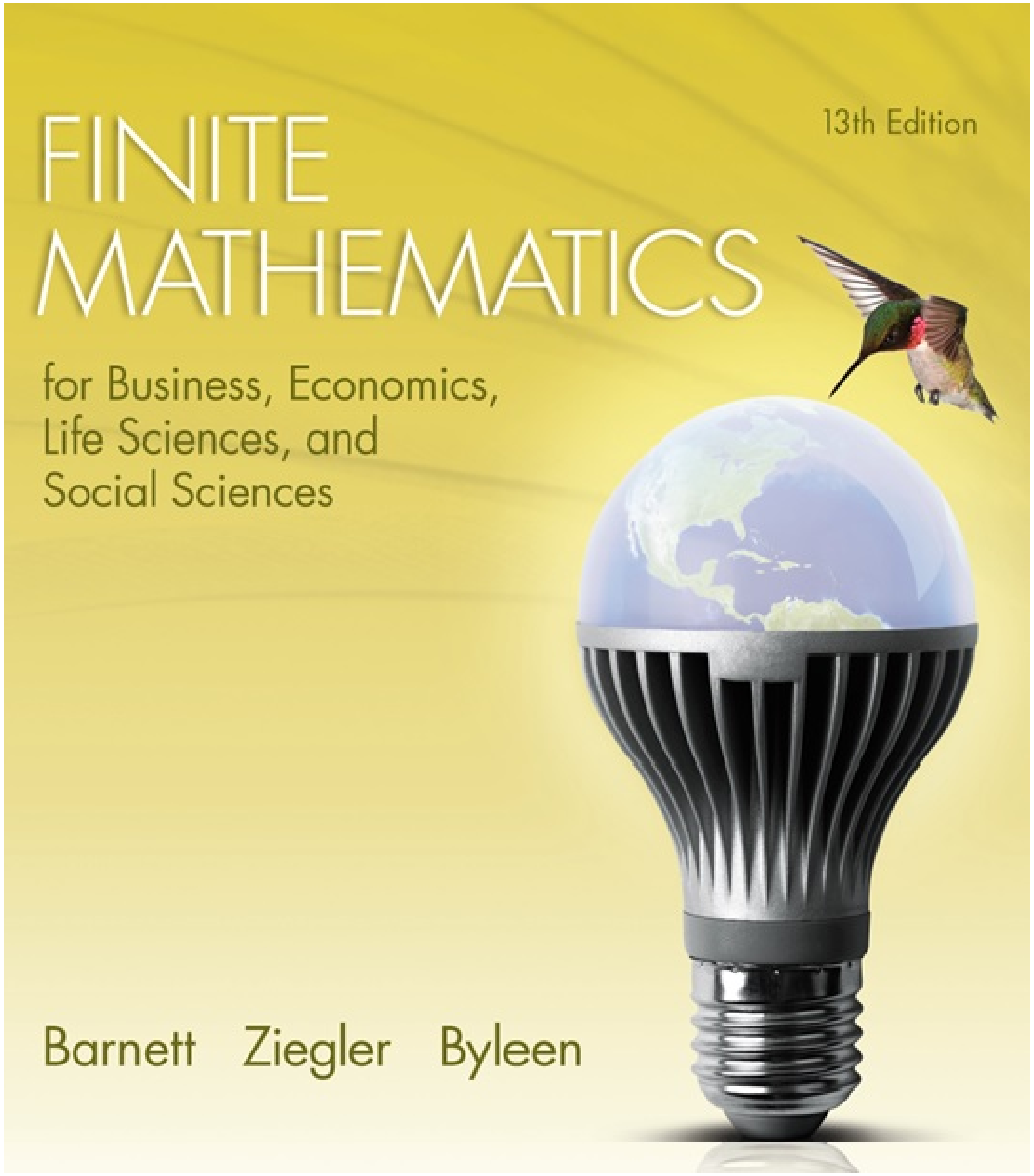

Chapter 3

Mathematics of Finance

Section R
Review

Chapter 3 Review
Important Terms, Symbols, Concepts

- 3.1 Simple Interest
  - **Interest** is the fee paid for the use of a sum of money P, called the **principal**. **Simple interest** is given by

$$I = Prt$$

where I = interest

P = principal,
r = annual simple interest rate (decimal form),
t = time in years

Chapter 3 Review
Important Terms, Symbols, Concepts

- 3.1 Simple Interest

  - If a principal P (**present value**) is borrowed, then the **amount** A (**future value**) is the total of the principal and the interest:

$$A = P + Prt$$
$$= P(1 + rt)$$

- The **average daily balance method** is a common method for calculating the interest owed on a credit card. The formula $I = Prt$ is used, but a daily balance is calculated for each day of the billing cycle, and P is the average of those daily balances.

Chapter 3 Review

- 3.2 Compound and Continuous Compound Interest
  - **Compound interest** is interest paid on the principal plus reinvested interest. The future and present values are related by

$$A = P(1+i)^n$$

where A = amount or future value

P = principal or present value

r = annual nominal rate (or just rate)

m = number of compounding periods per year,
i = rate per compounding period

n = total number of compounding periods.

Chapter 3 Review

- 3.2 Compound and Continuous Compound Interest
  - If a principal P is invested at an annual rate r earning **continuous compound interest**, then the amount A after t years is given by

$$A = Pe^{rt}.$$

Chapter 3 Review

- 3.2 Compound and Continuous Compound Interest (continued)
  - The **growth time** of an investment is the time it takes for a given principal to grow to a particular amount. Three methods for finding the growth time are as follows:
    1. Use logarithms and a calculator.
    2. Use graphical approximation on a graphing utility.
    3. Use an **equation solver** on a graphing calculator or a computer.

Chapter 3 Review

- 3.2 Compound and Continuous Compound Interest (continued)
  - The **annual percentage yield** APY (also called the **effective rate** or the **true interest rate**) is the simple interest rate that would earn the same amount as a given annual rate for which interest is compounded.
  - If a principal is invested at the annual rate *r* compounded *m* times a year, then the annual percentage yield is given by

$$APY = \left(1 + \frac{r}{m}\right)^m - 1$$

Chapter 3 Review

- 3.2 Compound and Continuous Compound Interest (continued)
  - If a principal is invested at the annual rate *r* compounded continuously, then the annual percentage yield is given by APY = $e^r - 1$.
  - A **zero coupon bond** is a bond that is sold now at a discount and will pay its **face value** at some time in the future when it matures.

Chapter 3 Review

- 3.3 Future Value of an Annuity; Sinking Funds
  - An **annuity** is any sequence of equal periodic payments. If payments are made at the end of each time interval, then the annuity is called an **ordinary annuity**. The amount or **future value**, of an annuity is the sum of all payments plus all interest earned and is given by

$$FV = PMT\frac{(1+i)^n - 1}{i}$$

PV = present value of all payments
PMT = periodic payment
i = rate per period
n = number of periods

Chapter 3 Review

- 3.3 Future Value of an Annuity; Sinking Funds (continued)
  - An account that is established to accumulate funds to meet future obligations or debts is called a **sinking fund**. The **sinking fund payment** can be found by solving the future value formula for PMT:

$$PMT = FV \frac{i}{(1+i)^n - 1}$$

Chapter 3 Review

- 3.4. Present Value of an Annuity; Amortization
  - If equal payments are made from an account until the amount in the account is 0, the payment and the present value are related by the formula

$$PV = PMT\,\frac{1-(1+i)^{-n}}{i}$$

where PV = present value of all payments,
PMT = periodic payment
i = rate per period,
n = number of periods

Chapter 3 Review

- 3.4 Present Value of an Annuity; Amortization (continued)
  - **Amortizing** a debt means that the debt is retired in a given length of time by equal periodic payments that include compound interest. Solving the present value formula for the payment give us the **amortization formula**

$$PMT = PV \frac{i}{1-(1+i)^{-n}}$$

Chapter 3 Review

- 3.4. Present Value of an Annuity; Amortization (continued)
  - An **amortization schedule** is a table that shows the interest due and the balance reduction for each payment of a loan.
  - The **equity** in a property is the difference between the current net market value and the unpaid loan balance. The unpaid balance of a loan with *n* **remaining payments** is given by the present value formula.