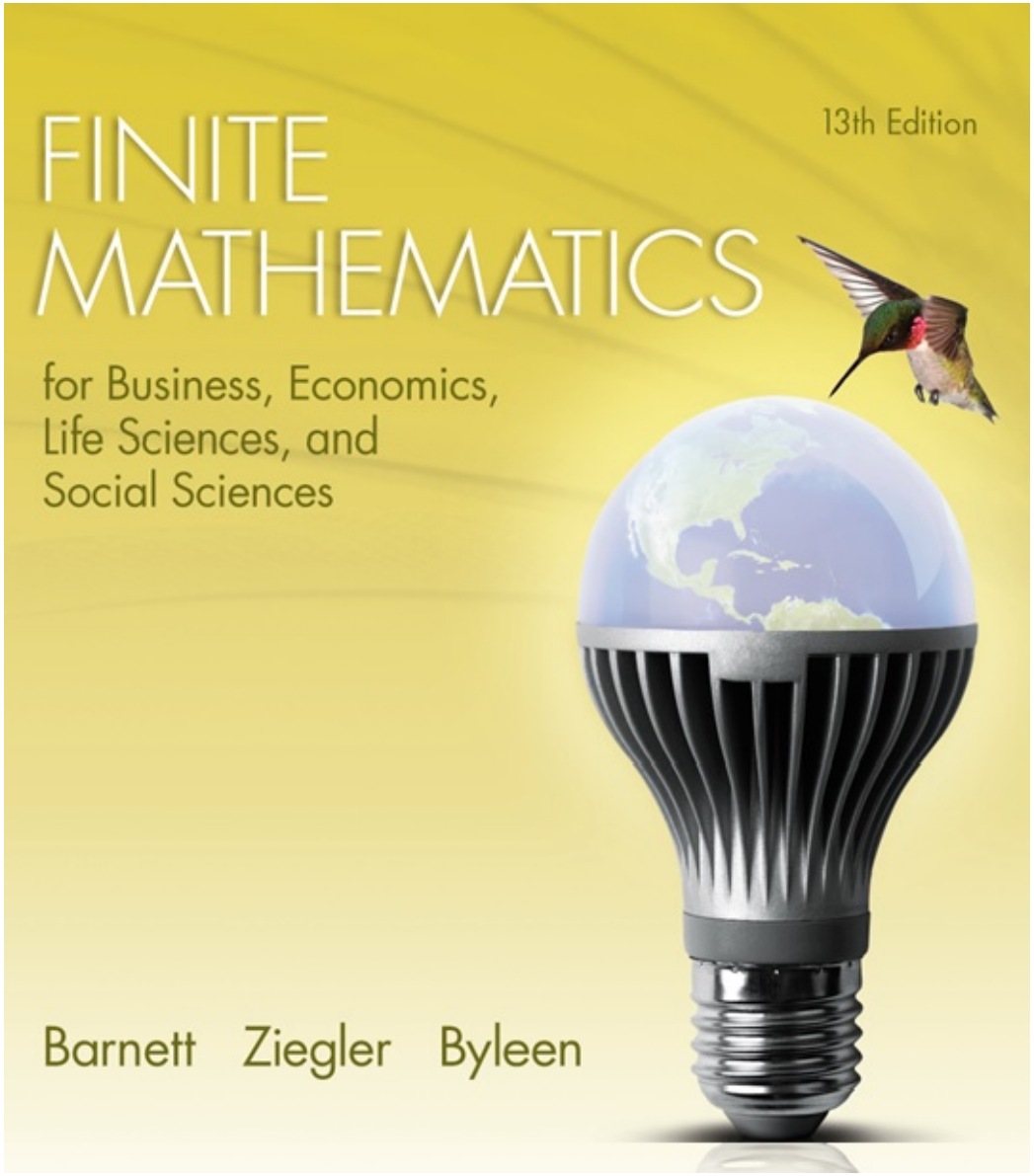


Chapter 3

Mathematics of Finance

Section 1

Simple Interest

Learning Objectives for Section 3.1 Simple Interest

- The student will be able to compute simple interest using the simple interest formula.
- The student will be able to solve problems involving investments and the simple interest formula.

3.1 Simple Interest

Definition:

$$I = Prt$$

where

I = interest earned

P = principal (amount invested)

r = interest rate (as a decimal)

t = time

An Example

Find the interest on a boat loan of $5,000 at 16% for 8 months.

Example

Find the interest on a boat loan of $5,000 at 16% for 8 months.

Solution: Use $I = Prt$

- $I = 5{,}000(0.16)(0.6667)$
- (8 months = 8/12 of one year 0.6667 years)
- $I = \$533.33$

Total Amount to Be Paid Back

- The total amount to be paid back for the boat loan would be $5000 plus the interest of $533.33, for a total of $5,533.33.

Present Value and Future Value

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

where

A = amount, or future value

P = principal, or present value

r = annual simple interest rate (as a decimal)

t = time in years

Another Example

- Find the total amount due on a loan of $600 at 16% interest at the end of 15 months.

Another Example

- Find the total amount due on a loan of $600 at 16% interest at the end of 15 months.

- **Solution:** $A = P(1 + rt)$

$$A = 600(1+0.16(1.25))$$

$$A = \$720.00$$

Interest Rate Earned on a Note

What is the annual interest rate earned by a 33-day T-bill with a maturity value of $1,000 that sells for $996.16?

Interest Rate Earned on a Note Solution

- **Solution:** Use the equation $A = P(1 + rt)$

$$1{,}000 = 996.16\left(1 + r\left(\frac{33}{360}\right)\right) \longleftarrow$$

We normally use 360 days for a financial year

$$1000 = 996.16(1+r(0.09166)) \rightarrow$$

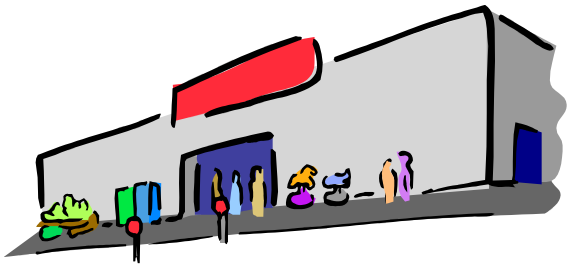
$$1000=996.16+996.16(0.09166)r \rightarrow$$

$$\frac{1000\text{-}996.16}{996.16(0.09166)} = r \rightarrow$$

$$r = 0.042 = 4.2\%$$

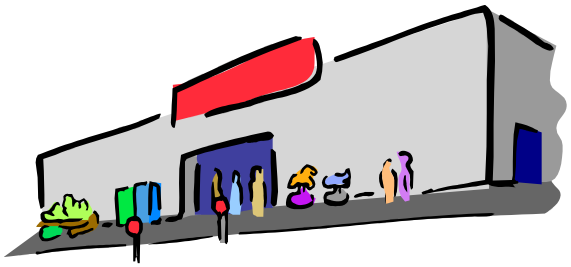
Another Application

- A department store charges 18.6% interest (annual) for overdue accounts. How much interest will be owed on a $1080 account that is 3 months overdue?



Another Application solution

- A department store charges 18.6% interest (annual) for overdue accounts. How much interest will be owed on a $1080 account that is 3 months overdue?



Solution:

$I = Prt$

$I = 1080(0.186)(0.25)$

$I = \$50.22$