Are there any Homework Questions you would like to see on the board?

pp. 486-488 #1 – 3, 6, 7, 10, 14
READ pp. 489-490
(Mid-Chapter Review) pp. 491-492 # 1, 2, 4 – 14

Today's Learning Goal(s):

By the end of the class, I will be able to:

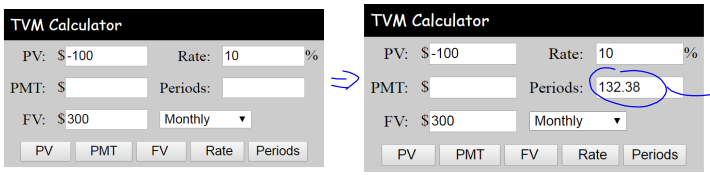
a) Solve future-value problems involving regular payments or deposits.

p. 487 **7.** How long does it take for an investment to triple in value at 10%/a interest compounded monthly?

$A = 300$
$P = 100$
$i = \frac{0.10}{12}$
$n = x \times 12$
$= 12x$

$A = P(1+i)^n$
$300 = 100\left(1 + \frac{0.10}{12}\right)^{12x}$
$\frac{300}{100} = \left(1 + \frac{0.1}{12}\right)^{12x}$
$3 = \left(1 + \frac{0.1}{12}\right)^{12x}$

use TVM



$132.38 = 12x$
$\therefore x = \frac{132.38}{12}$
$x = 11.031$

p. 488 **14.** Tresha paid for household purchases with her credit card. The credit card company charges 18%/a compounded monthly. Tresha forgot to pay the monthly bill of $465 for 3 months after it was due to be paid.

a) How much does Tresha owe at the end of each of the 3 months?
b) How much of each amount in part (a) is interest?

a) $A_1 = ?$
$P = 465$
$i = \frac{0.18}{12}$
$n = 1$

$A_1 = 465\left(1 + \frac{0.18}{12}\right)^1$
$A_1 = 471.975$
$= \$471.98$

$A_2 = 471.98\left(1 + \frac{0.18}{12}\right)^1$
or
$A_2 = 465\left(1 + \frac{0.18}{12}\right)^2$
$= 479.059$
$= 479.06$

$= \frac{1}{12} \times 12$

$A_3 = 465\left(1 + \frac{0.18}{12}\right)^3$
$= 486.240$
$= \$486.24$

$\$479.054$
$= 479.05$

b) $I_1 = 471.98 - 465$
$= \$6.98$

$I_2 = 479.05 - 471.98$
$= 7.07$

But
$I_{1\text{-}2} = 479.05 - 465$
$= \$14.05$

$I_3 = 486.24 - 479.05$
$= 7.19$

But
$I_{1\text{-}3} = 486.24 - 465$
$= \$21.24$

MCF 3MI

8.5 Regular Annuities: Determining Future Value

$$A = \frac{R\left[(1+i)^n - 1\right]}{i}$$

Date: June 4/19

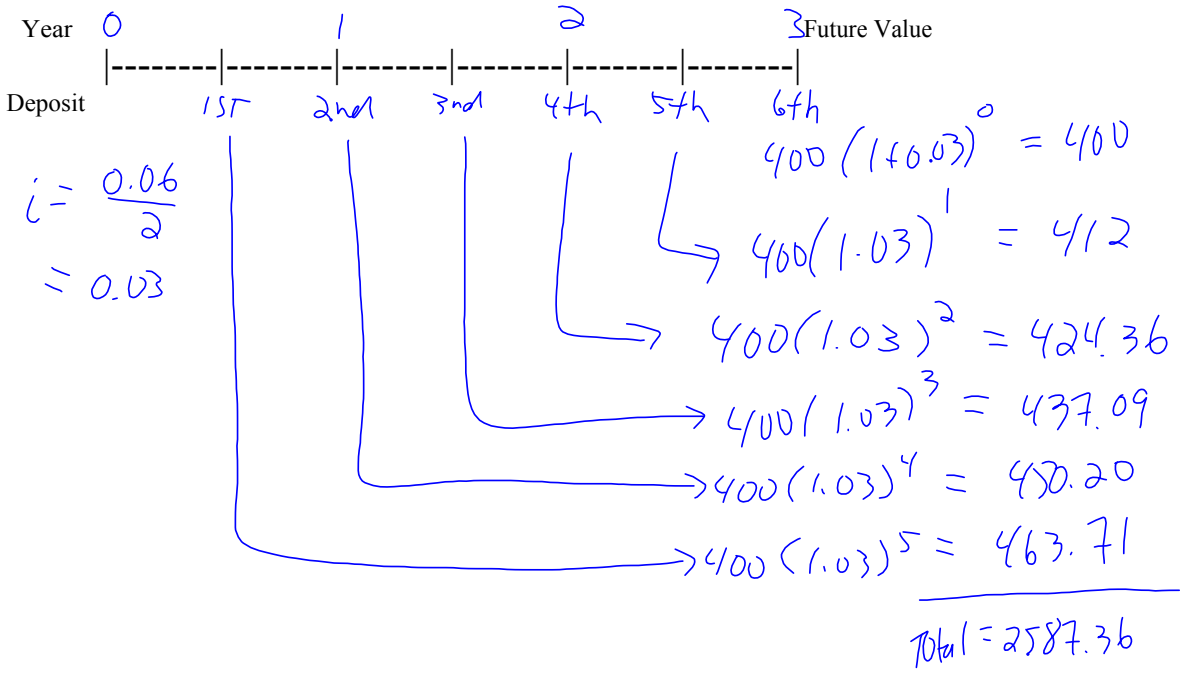
Annuity – a series of equal deposits or payments made at regular intervals
Simple Annuity – payments coincide with the compounding period
Ordinary Annuity – payments are made at the end of each interval

*** We will only be dealing with simple, ordinary annuities ***

Ex. 1: You make deposits of $400 semi-annually into an account that pays interest at 6%/*a* compounded semi-annually.

a) How much money will be in the account after 3 years?
b) How much interest is earned over the 3-year term?

Method 1: Create a Timeline



after 3 years, the account will have $2587.36.

$2587.36

Deposits = 400 × 6
= $2400

I = Total − Deposits
= 2587.36 − 2400
= $187.36

$187.36

we earned $187.36 in interest.

Ex. 1: You make deposits of $400 semi-annually into an account that pays interest at 6%/*a* compounded semi-annually.

a) How much money will be in the account after 3 years?

b) How much interest is earned over the 3-year term?

Method 2: Use the Annuity Formula (by hand)

$$A = \frac{R\left[(1+i)^n - 1\right]}{i}$$

A is the amount or future value
R is the deposit or payment
i is the interest rate per compounding period
n is the total number of deposits

$= \frac{400\left[(1+0.03)^6 - 1\right]}{0.03}$

$= \$2587.36$

$R = 400$

$i = \frac{0.06}{2}$

$= 0.03$

$n = 3 \times 2$

$= 6$

after 3 years, the account will have $\$2587.36$. $2587.36

$\text{Deposits} = 400 \times 6$

$= \$2400$

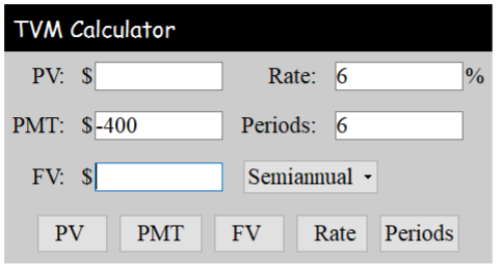
$I = \text{Total} - \text{Deposits}$

$= 2587.36 - 2400$

$= \$187.36$ $187.36

we earned $\$187.36$ in interest.

Method 3: Use the TVM Calculator



Ex. 2: You want to retire in 30 years with $1 000 000 in savings.
Your current investments are earning, on average, 11%/*a* compounded annually.

a) What annual deposit must you make to reach your savings goal?

Method 1: Use the Annuity Formula (by hand)

$$A = \frac{R\left[(1+i)^n - 1\right]}{i}$$

A is the amount or future value
R is the deposit or payment
i is the interest rate per compounding period
n is the total number of deposits

$1000000 = \frac{R\left[(1+0.11)^{30}-1\right]}{0.11}$

$0.11(1000000) = R\left[(1.11)^{30}-1\right]$

$\frac{0.11(1000000)}{\left[(1.11)^{30}-1\right]} = R$

$R \doteq 5024.598$

$A = 1000000$

$R =$

$i = \frac{0.11}{1}$

$= 0.11$

$n = 30 \times 1$

$= 30$

$\$5024.60$

$5024.60

you must make annual deposits of $\$5024.60$.

b) How much of the $1 000 000 is interest earned?

Deposits $= 5024.60 \times 30$

$= \$150\,738$

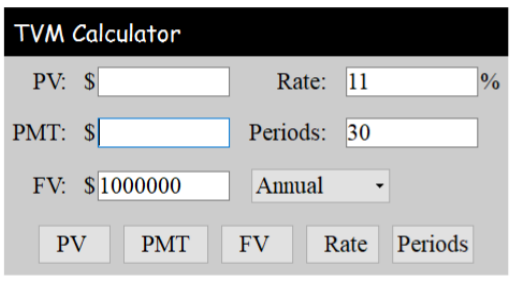
$I = 1000000 - 150738$

$= \$849\,262$

$849 262

of the $1 000 000, $\$849\,262$ is earned interest .

Method 2: Use the TVM Calculator



Revisit Today's Learning Goals

Today's Homework:

pp. 498-500 # 1, 3, 4ac, 5, 7, 9, 10

Continue completing your UNIT ASSIGNMENT!!