

5.5 Effects of Changing the Conditions on Investments and Loans

Ex. 1 What effect does compounding frequency have?
Fill in the table below.



	Final Amount After 5 Years		
	GIC A at 6% compounded annually	GIC B at 6% compounded semi- annually	GIC C at 6% compounded quarterly
Principal (\$)	A =	A =	A =
100.00	133.82	134.39	134.69
1000.00	1338.23	1343.92	1346.86
10000.00	13382.26	13439.16	13468.55

➡ The more frequent the compounding, the greater the final amount.

Ex.2 Amanda wants to have $\overset{FV}{\$7000}$ in 4 years to buy a car. She has seen ads for two 4-year GICs with the following interest rates and compounding frequencies:

- A: interest rate of 6%, compounded annually
- B: interest rate of 5.6%, compounded quarterly

Which will require a smaller principal? How much less?

Method #1: use the formula $P = A(1 + i)^{-n}$

GIC A:

$$P = ?$$

$$A = 7000$$

$$i = 0.06$$

$$n = 4$$

$$P = 7000(1.06)^{-4}$$

$$\doteq 5544.66$$

GIC B:

$$P = ?$$

$$A = 7000$$

$$i = \frac{0.056}{4} = 0.014$$

$$n = 4 \times 4$$

$$= 16$$

$$P = 7000(1.014)^{-16}$$

$$\doteq 5603.90$$

Calculate the difference:

GIC A requires 59.24 less in principal than B

Method #2: Use TVM Solver

GIC A:

GIC B:

N= 4
I%= 6
PV= ALPHA ENTER 5544.65
PMT=0 ★
FV=7000
P/Y=1
C/Y=1
PMT: END BEGIN

N= 4
I%= 5.6
PV=? 5603.90
PMT=0 ★
FV=7000
P/Y=1
C/Y=4
PMT: END BEGIN

Calculate the difference...

$$= 59.24$$

Ex. 3 For a \$5000 investment, at 8%/a, compounded quarterly, use a graph to compare the final amounts and total interest after

- a) four years
- b) eight years
- c) twelve years

a) $n = 4 \times 4 = 16$

$$A = 5000(1.02)^{16} \approx 6863.92$$

b) $n = 8 \times 4 = 32$

$$A = 5000(1.02)^{32} \approx 9422.70$$

c) $n = 12 \times 4 = 48$

$$A = 5000(1.02)^{48} \approx 12935.35 \quad \star$$

$A = ?$

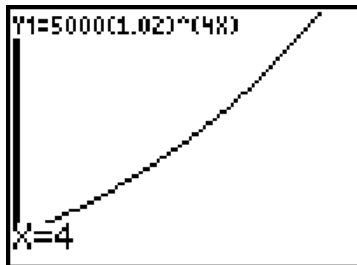
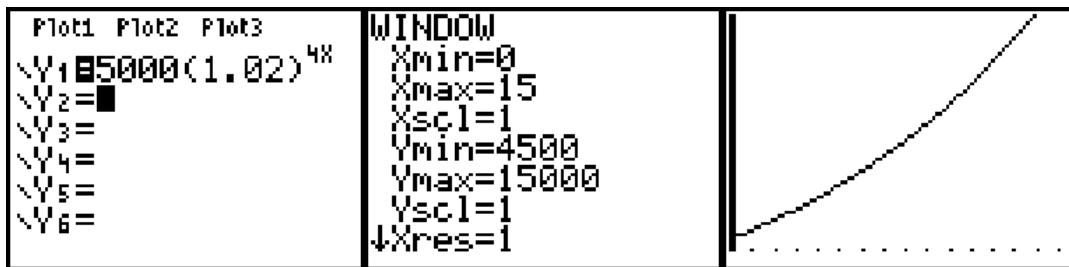
$P = 5000$

$i = \frac{0.08}{4} = 0.02$

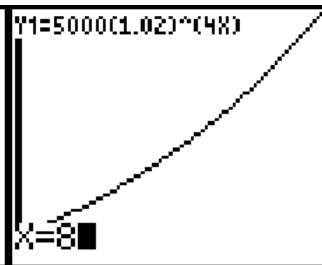
$n = ?$

Enter the equation as shown and change the window before pressing the Graph key.

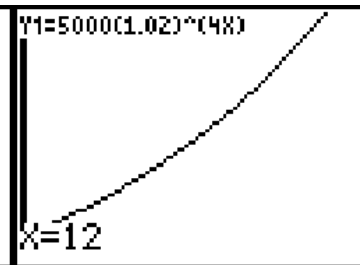
Then use 2nd CALC ENTER Type in x value ENTER



A =

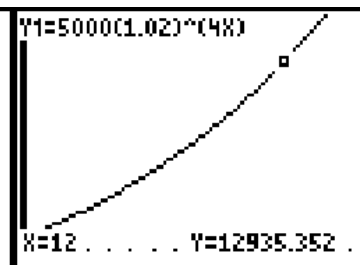
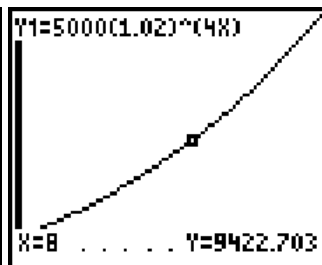
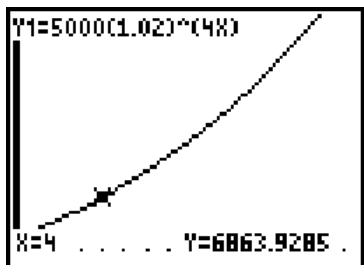


A =



A =

Answers



Ex. 4

Joakim would like to have ~~\$8000~~^{FV} in 5 years. Determine the amount he would need to invest at each rate to reach his goal.

- a) 6% per year, compounded quarterly
- b) 5.2% per year, compounded monthly
- c) 4.8% per year, compounded weekly

6% compounded quarterly

Method 1

$$P =$$

$$A = 8000$$

$$i = \frac{0.06}{4} = 0.015$$

Using TVM

N=5
I%=6
PV=?
PMT=0
FV=8000
P/Y=1
C/Y=4
PMT: END BEGIN

$$PV = 5939.76$$

5.2% compounded monthly

Method 1

$$P =$$

$$A = 8000$$

$$i = \frac{0.052}{12} = 0.0043$$

Using TVM

N=5
I%=5.2
PV=?
PMT=0
FV=8000
P/Y=1
C/Y=12
PMT: END BEGIN

$$PV = 6171.88$$

4.8% compounded weekly

Method 1

$$P =$$

$$A = 8000$$

$$i = \frac{0.048}{52} = 0.00093$$

Using TVM

N=5
I%=4.8
PV=?
PMT=0
FV=8000
P/Y=1
C/Y=52
PMT: END BEGIN

$$PV = 6293.71$$

↑ Lowest initial investment to reach \$8000 in 5 yrs

HEREwork:
Pg. 450
#1, 2, 3, 4, 8, 10

