ST. JEAN DE BREBEUF MATHEMATICS

CHAPTER 9.2

INVESTMENT ALTERNATIVES

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KEY CONCEPTS

All investments carry some level of **risk**.
→ **Risk** is the term used for the uncertainty or the likelihood that an investment will decrease in value.
→Generally, the greater the risk, the greater the potential return (or loss).

Some investments increase in value while others lose value.

One way to accumulate wealth is to **invest regularly** over a **long period of time**.
→This takes advantage of the power of compound interest.

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KEY CONCEPTS

The two main types of investment alternatives we will explore are

Mutual funds

→ type of investment where people **pool their money together** to buy *stocks*, *bonds*, and other assets

→**managed by an investment company** that charges a fee

→Different funds have different **growth rates** (the percent by which an investment increases (or decreases) in value over a given time)

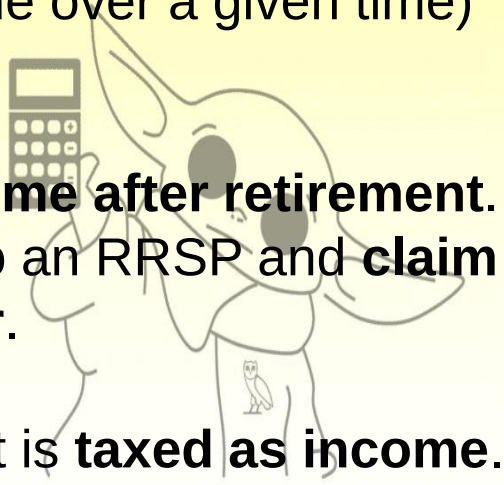
Registered Retirement Savings Plan (RRSP)

→An investment that is set up to **provide income after retirement**.

→Generally, you are allowed to put money into an RRSP and **claim a deduction on your income tax in that year**.

→Contributions accumulate **interest tax-free**.

→When the money is *taken out* of the RRSP, it is **taxed as income**.



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EXAMPLE 1

One-Time Investments

A mutual fund has an average annual rate of return of **13%**. The investment company **charges 3% per year** as a fee for managing the account. Suppose **$1000** is invested for **three years**.

Remaining percent
13 – 3
= **10%**

10 / 100
= **0.1**

Calculate the approximate value of the investment, assuming **annual compounding**. The *future value* of the investment will be an approximation since all conditions of the investment may not be known.

Method 1: Using the Compound Interest Formula

$$A = P(1+i)^n$$
$$A = 1000(1+0.1)^3$$
$$A = 1000\,(1.1)^3$$
$$A = \$1331$$

The investment will be worth **$1331** after three years.

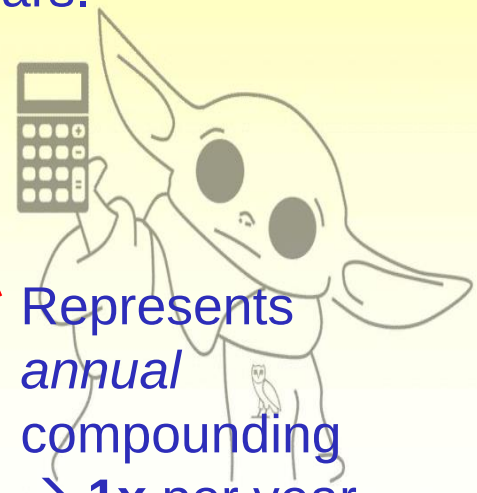
P = **1000**

i = r / N
= 0.1 / 1
= **0.1**

n = yN
= 3(1)
= **3**

N = 1

Represents *annual* compounding
→ **1x** per year



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Calculate the approximate value of the investment, assuming **annual compounding**. The *future value* of the investment will be an approximation since all conditions of the investment may not be known.

Method 2: Using the TVM Solver

Only one payment (deposit) was made in **3 years**

N= 3 x 1 **3**
I%= **10**
PV= **– 1000**
PMT= **0**
FV= 0 **1331**
P/Y= **1**
C/Y= **1**

Expressed as negative → Money being paid out

ALPHA then **ENTER**

Annual compounding → **1x** per year

The investment will be worth **$1331** after three years.

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EXAMPLE 2

An Investment That Decreases in Value

Investing often carries an element of risk. Some investments increase in value while some decrease in value. A mutual fund has an average annual **rate of return of – 6%**. The company **charges 2% per year** to manage the account.

Remaining percent
– 6 – 2
= **– 8%**

– 8 / 100
= **– 0.08**

Calculate the approximate value of a **$1000** investment after **five years**, **N = 2** assuming **semi-annual compounding**. The value of the investment will be an approximation since all conditions of the investment may not be known.

Method 1: Using the Compound Interest Formula

$$A = P(1+i)^n$$
$$A = 1000(1+[-0.04])^{10}$$
$$A = 1000(1-0.04)^{10}$$
$$A = 1000(0.96)^{10}$$
$$A = \$664.83$$

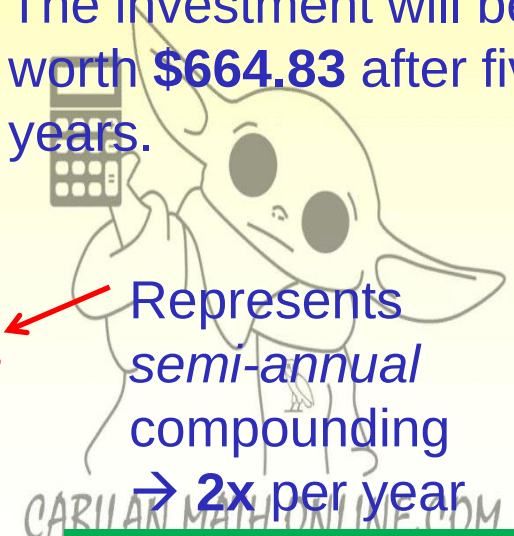
The investment will be worth **$664.83** after five years.

P = **1000**

i = r / N
= – 0.08 / 2
= **– 0.04**

n = yN
= 5(2)
= **10**

Represents *semi-annual* compounding
→ **2x** per year



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Calculate the approximate value of a **$1000** investment after **five years**, assuming **semi-annual compounding**. The value of the investment will be an approximation since all conditions of the investment may not be known.

Method 2: Using the TVM Solver

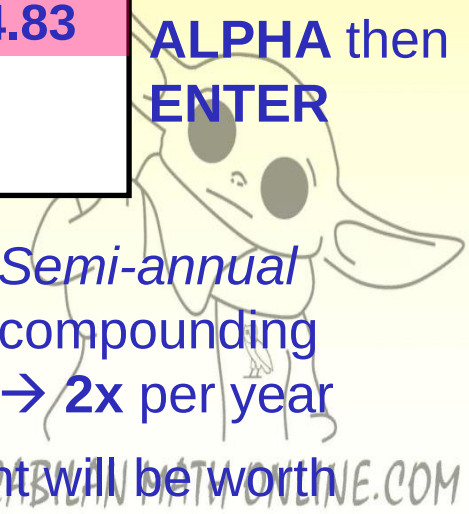
Only one payment was made in **five years**

N= 5 x 1 **5**
I%= **– 8**
PV= **– 1000**
PMT= **0**
FV= 0 **664.83**
P/Y= **1**
C/Y= **2**

Expressed as negative
→ Money being paid out

ALPHA then **ENTER**

Semi-annual compounding
→ **2x** per year



The investment will be worth **$664.83** after five years.

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EXAMPLE 3 *Regular Investments*

Many people set up an investment, such as a **Registered Retirement Savings Plan (RRSP)** , as a series of small, regular investments. Suppose you invest **$300 per month** from **age 20** until your retirement at **age 55**.

For # **of years**
= 55 – 20
= **35**

Assume the investment averages a **7%** annual rate of return, **compounded monthly**. How much money will you have upon retirement? Use the **TVM Solver** to calculate.

Total # of payments
= **# of years** x **# of months**
= 35 x 12
= **420**

ALPHA then **ENTER**

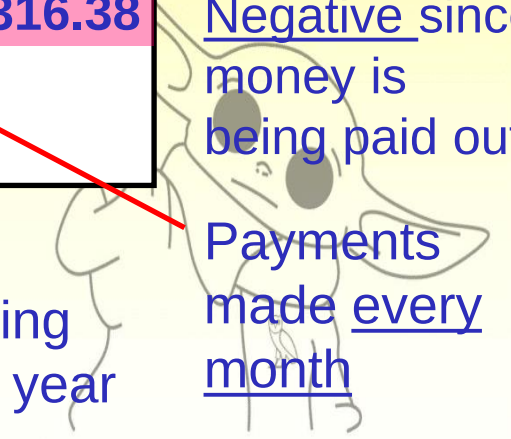
N=	35 x 12 **420**
I%=	**7**
PV=	**0**
PMT=	**– 300**
FV=	0 **540316.38**
P/Y=	**12**
C/Y=	**12**

Entered in **PMT** since payments are made at regular intervals (monthly)

Negative since money is being paid out

Payments made every month

Monthly compounding → **12x** per year



Upon retirement, you will have **$540 316.38**.

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Homework:

Go on to the *Internet* and "Google" the term **GUARANTEED INVESTMENT CERTIFICATE (GIC)**; print out information and place in notes

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