HOMEWORK...

p. 457: #1, 2

p. 468: #2, 6, 7

Simple

I = Prt

&

A = P + I

A = P + Prt

A= P(1 + rt)

Compound

$$A = P\left(1 + \frac{r}{n}\right)^{nt}$$

$$I = A - P$$

7. Suppose that you are searching online for the best interest rates on a GIC. You find these rates:
   - Bank A offers 6.6%, compounded annually.
   - Bank B offers 6.55%, compounded semi-annually.
   - Bank C offers 6.5%, compounded quarterly.

   Rank these rates from greatest to least return on an investment of $20 000 for a term of 2 years.

A $A = 20000\left(1+\frac{0.066}{1}\right)^{1\times 2}$

$A =$ 20000(1+0.066)^2 → 22727.12 (3) Worst

B: $A = 20000\left(1+\frac{0.0655}{2}\right)^{4}$

20000(1+0.0655/2)^4 → 22751.54062 (2)

C: $A = 20000\left(1+\frac{0.065}{4}\right)^{8}$

$=$ 20000(1+0.065/4)^8 → 22752.77984 (1) Best

EXAMPLE 4 p. 463

Comparing interest on investments with different compounding periods

Céline wants to invest $3000 so that she can buy a new car in the next 5 years. Céline has the following investment options:

A. 4.8% compounded annually
B. 4.8% compounded semi-annually * Popular.
C. 4.8% compounded monthly
D. 4.8% compounded weekly
E. 4.8% compounded daily


```
3000(1+0.048/1)^
5
      3792.518151
```

```
3000(1+0.048/2)^
10
      3802.951801
```

```
3000(1+0.048/12)
^60
      3811.922156
```

```
3000(1+0.048/52)
^(52*5)
      3813.325288
```

```
3000(1+0.048/365
)^(365*5)
      3813.687273
```

Present Value...

$ needed to invest NOW to get a fixed amount later

$$P = \frac{A}{\left(1+\frac{r}{n}\right)^{nt}}$$

$$A = P\left(1+\frac{r}{n}\right)^{nt}$$

$$\frac{A}{\left(1+\frac{r}{n}\right)^{nt}} = \frac{P\left(1+\frac{r}{n}\right)^{nt}}{\left(1+\frac{r}{n}\right)^{nt}}$$

p. 465

Rule of 72

A simple formula for estimating the doubling time of an investment; 72 is divided by the annual interest rate as a percent to estimate the doubling time of an investment in years.

The Rule of 72 is most accurate when the interest is compounded annually.

EXAMPLE 5 Estimating doubling times for investments

Both Berta and Kris invested $5000 by purchasing Canada Savings Bonds. Berta's CSB earns 8%, compounded annually, while Kris's CSB earns 9%, compounded annually.

a) Estimate the doubling time for each CSB.

$$Rule\ of\ 72 = \frac{72}{Rate}$$

%

↳ the time it takes for an investment to DOUBLE in value.

Berta

$\frac{72}{8} = 9$ yrs

Kris

$\frac{72}{9} = 8$ yrs

8.4 Compound Interest: Present Value

GOAL

Determine the principal or present value of an investment, given its future value and compound interest rate.

EXAMPLE 2 p. 475 — Determining the present value of an investment that is compounded quarterly

Agnes and Bill are musicians. They have researched the costs to set up a small recording studio. They estimate that $40 000 will pay for the soundproofing, recording equipment, and computer hardware and software that they need. They plan to set up the studio in 3 years and have invested money at 9.6%, compounded quarterly, to save for it.

a) How much money should they have invested?

b) How much interest will they earn over the term of their investment?

A

P = ?

a) $P = \frac{A}{(1+\frac{r}{n})^{nt}}$

$P = \frac{40000}{(1+\frac{0.096}{4})^{12}}$

$P = 30092.65538$

$\$30092.66$

b) $I = A - P$

$I = 40000 - 30092.66$

$\$9907.34$

HOMEWORK...

p. 468: **Rule of 72...**

#3 (only estimate the doubling time)

#5a & #8

Compound Interest (Future Value)

#10 & #12

p. 478: **Compound Interest (Present Value)**

#4, #6, #7, & #9