HOMEWORK... Questions

p. 457: #1, 2

p. 468: #2, 6, 7

Simple

$I = Prt$

&

$A = P + I$

$A = P + Prt$

$A = P(1 + rt)$

Compound

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

$$I = A - P$$

P. 468

6. Trust funds are investments that are set up for a specific purpose. A local business invested $250 000 in a charitable trust fund so that a school can offer scholarships. The interest rate is 3.8%, compounded semi-annually. Only the interest earned can be used to provide the scholarships. How much is available from the trust fund for scholarships each year?

$$A = 250000\left(1 + \frac{0.038}{2}\right)^{2\times 1}$$

$A =$

```
250000(1+0.038/2
)^2
          259590.25
Ans-250000
            9590.25
```

Interest

$I = A - P$

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.

C

$A = 20000\left(1+\frac{0.065}{4}\right)^{4\times 2}$

```
20000(1+0.065/4)
^8
          22752.77984
Ans-20000
          2752.779838
```

I = #1

A

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

```
20000(1+0.066)^2
          22727.12
Ans-20000
          2727.12
```

A = I = #3

B

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

```
20000(1+0.0655/2
)^4
          22751.54062
Ans-20000
          2751.540622
```

A = I = #2

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.

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

a) Berta

$t = \frac{72}{8}$

$t = 9$ years

Kris

$t = \frac{72}{9}$

$t = 8$ years

```
5000(1+0.08)^9
     9995.023136
5000(1+0.09)^8
     9962.813208
```

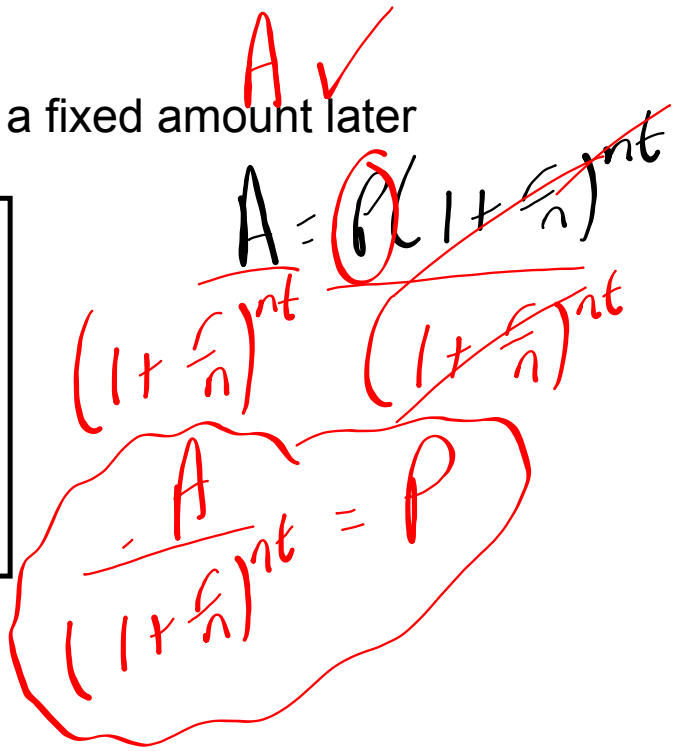
Exact time

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

Present Value...

$ needed to invest NOW to get a fixed amount later

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



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? P = ?

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

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

$P = \frac{40000}{(1+\frac{0.096}{4})^{4\times 3}}$

$P = \$30092.66$

Another Example...

Mr. Hallihan needs a new bass boat. He figures he can get a nice one for $10 000 but does not have that money right now. How much should he invest? at 5.2 % compounded monthly so he can buy the boat in 5 years?

$$P = \frac{10\,000}{\left(1 + \frac{0.052}{12}\right)^{12 \times 5}}$$

$$P = \$7714.85$$

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