8.1 Simple Interest June 4

I=Prt, A=P+I

I- INTEREST EARNED

P- PRINCIPAL (INITIAL AMOUNT)

r- RATE OF INTEREST /yr.

t- TIME IN YEARS

A- FINAL AMOUNT

ex. $1000 loan from your parents at 10%/yr simple interest for 4 years. How much do you owe them?

$I = Prt$

$= (1000)(0.1)(4)$

$= 400$

$A = P + I$

$= 1000 + 400$

$= 1400$

∴ you owe them $1400

ex. Invest $50,000 in the bank of Brooks, which pays 5%/yr simple interest. How much do you get back after 100 days.

365 days /yr

$t = \frac{100}{365} = 0.27397$

$I = Prt$

$= (50000)(0.05)(0.27397...)$

$= 684.93$

$A = P + I$

$= 50\,684.93$

∴ you get back $50,684.93

p. 481#1b,3,4,5acef,6,7,10

8.2 Compound Interest

– INTEREST IS ACCUMULATED ON PREVIOUS INTEREST.

Compounding Periods

annually- 1 TIME/yr

semi-annually- 2 TIMES/yr

monthly- 12 TIMES/yr

weekly- 52 TIMES/yr

daily- 365 TIMES/yr

quarterly- 4 TIMES/yr (EVERY 3 MONTHS)

bi-monthly- 6 TIMES/yr (ONCE EVERY 2 MONTHS)

bi-weekly- 26 TIMES/yr (ONCE EVERY 2 WEEKS)

semi-monthly- 24 TIMES/yr

Compound Interest Formula

$P,\ P(1+i),\ P(1+i)^2,\ P(1+i)^3 + \cdots\ P(1+i)^n$

$$A = P(1+i)^n$$

P- PRINCIPAL (INITIAL AMOUNT)

i- INTEREST RATE / COMPOUNDING PERIOD

n- # COMPOUNDING PERIODS

A- FINAL AMOUNT

ex. Invest $5000 at 4.8%/a compounded quarterly for 20 years. How much will the investment be worth?

$i = 0.048/4 = .012$

$n = 20 \times 4 = 80$

$A = P(1+i)^n$

$= 5000(1.012)^{80}$

$= 12984.07$

∴ INVESTMENT WILL BE WORTH $12,984.07

On her 15th birthday, Trudy invests $10 000 at 8%/a compounded monthly. When Lina turns 45, she invests $10 000 at 8%/a compounded monthly. If both women leave their investments until they are 65, how much more will Trudy's investment be worth?

TRUDY

$i = 0.08/12 = .00\overline{6}$

$n = 50 \times 12 = 600$

$A = P(1+i)^n$

$= 10000(1.00\overline{6})^{600}$

$= 538\,781.83$

LINA

$i = 0.00\overline{6}$

$n = 20 \times 12 = 240$

$A = 10000(1.00\overline{6})^{240}$

$= 49\,268.03$

TRUDY − LINA = $489 513.80

∴ TRUDY'S IS WORTH $489 513.80 MORE.

Nicolas invests $1000. How long would it take for his investment to double for each type of interest earned?

a) 5%/a simple interest

b) 5%/a compounded semi-annually

a) $I = Prt$, $A = P + I$

$I = 1000$

$P = 1000$

$I = Prt$

$1000 = 1000(.05)t$

$\frac{1}{.05} = t$

$t = 20$ yrs

b) $A = P(1+i)^n$

$A = 2000$

$P = 1000$

$i = .05/2 = .025$

$A = P(1+i)^n$

$2000 = 1000(1.025)^n$

$2 = (1.025)^n$

$n = \frac{\log 2}{\log 1.025} = 28.07$ ($\frac{1}{2}$ yrs)

$\therefore$ 14 years

p. 490#1,2b,3d,4e,6,10,11

8.3 Present Value

↳ PRINCIPAL

– HOW MUCH MONEY NEEDS TO BE INVESTED TODAY TO SAVE $\$\_\_\_\_$ IN THE FUTURE?

$$A = P(1+i)^n$$

$$\frac{A}{(1+i)^n} = P$$

$$P = A(1+i)^{-n}$$

ex. How much money needs to be invested today to save $15000 in 10 years at 6%/a compounded annually?

$i = .06$
$n = 10$

$P = A(1+i)^{-n}$
$= 15000(1.06)^{-10}$
$= \$8375.92$

∴ INVEST $\$8375.92$ TODAY.

Tony is investing $5000 that he would like to grow to at least $50 000 by the time he retires in 40 years. What annual interest rate, compounded annually, will provide this? Round your answer to two decimal places.

$A = P(1+i)^n$

$50000 = 5000(1+i)^{40}$

$10 = (1+i)^{40}$

$10^{1/40}$

$\sqrt[40]{10} = (1+i)$

$\sqrt[40]{10} - 1 = i$

$i = 0.0593$

∴ INTEREST 5.93%/a.

p. 498#3-8,10,14