MATH 111

HW # 8

(1)

Ex 5.3

~~26/~~ $A = 12{,}000$ , $P = ?$ , $i = \frac{0.08}{4} = 0.02$ , $n = 3 \times 4 = 12$

$$12000 = P\left[\frac{(1+0.02)^{12}-1}{0.02}\right]$$

$$12000 = P(13.41208975)$$

$$P \approx \underline{\underline{894.72}}$$

She should deposit 894.72 per quarter

28/ $A = 30{,}000$ , $P = ?$ , $i = \frac{0.09}{12} = 0.0075$ , $n = 4 \times 12 = 48$

$$30{,}000 = P\left[\frac{(1+0.0075)^{48}-1}{0.0075}\right]$$

$$30000 = P(57.52071107)$$

$$P \approx \underline{\underline{521.55}}$$

They should deposit $521.^{55}$ per month

~~34/~~ $A = 1{,}000{,}000$ , $P = 10{,}000$ , $i = \frac{0.08}{1} = 0.08$ , $n = ?$

$$1{,}000{,}000 = 10{,}000\left[\frac{(1+0.08)^n-1}{0.08}\right]$$

$$100 = \frac{1.08^n - 1}{0.08}$$

$$8 = 1.08^n - 1$$

$$1.08^n = 9$$

From table 1, pg 686 , $28 \le n \le 29$

It will take 29 years to accumulate \$1,000,000

Ex 5.3

30/. $P = 7500$ , $i = 0.08$ , $n = 25$

$$A = 7500 \left[ \frac{(1+0.08)^{25} - 1}{0.08} \right]$$

$$= 7500 \, (73.10593995)$$

$$= \underline{548,294.55}$$

There will be \$548,294.55 in the account after 25 years.

~~34/. $P = 10,000$ , $i = 0.08$ , $A = 1,000,000$~~

~~$$1,000,000 = 10,000 \left[ \frac{(1+0.08)^n - 1}{0.08} \right]$$~~

~~$$100 = \left[ \frac{(1.08)^n - 1}{0.08} \right]$$~~

~~$$8 = 1.08^n - 1$$~~

~~$$1.08^n = 9$$~~

~~From table 1, pg 686, $n \approx 29$~~

~~∴ It will take 29 years to accumulate \$1,000,000~~

36/. (a) $R = 2000$ , $i = 0.08$ , $n = 10$

Find A at the end of 10 years,

$$A = 2000\left[\frac{(1+0.08)^{10}-1}{0.08}\right]$$

$$= 2000(14.48656246)$$

$$\cong \underline{28,973.12}$$

At the end of the next 30 years,

$$A = 28,973.12(1+0.08)^{30}$$

$$= 28,973.12(10.06265689)$$

$$\cong \underline{291,546.57}$$

(b) $R = 2000$ , $i = 0.08$ , $n = 30$

At the end of the last 30 years, Carol had

$$A = 2000\left[\frac{(1+0.08)^{30}-1}{0.08}\right]$$

$$= 2000(113.2832111)$$

$$\cong \underline{226,566.42}$$

(c) Tanya had more money at the end of the period.

Ex 5.4

16/ $V = ?$, $P = 300$, $i = \frac{0.10}{12}$, $n = 25 \times 12 = 300$

$$V = 300 \left[ \frac{1 - \left(1 + \frac{0.10}{12}\right)^{-300}}{\frac{0.10}{12}} \right]$$

$$= 300\,(110.0472291)$$

$$\approx \underline{\underline{33,014.17}}$$

She needs to invest \$33,014.17 now to guarantee herself \$300 every month for the next 25 years.

Ex. 5.4

19/(a) Amount to be amortized = 200,000 − 40,000 = 160,000

At 8% for 20 years:

$$160{,}000 = P\left[\frac{1-(1+0.08/12)^{-240}}{0.08/12}\right]$$

$$160{,}000 = P\,(119.5542941)$$

$$P \approx \underline{1338.30}$$

At 9% for 25 years:

$$160{,}000 = P\left[\frac{1-(1+0.09/12)^{-300}}{0.09/12}\right]$$

$$\cancel{160{,}000 = P\,(119.1616222)}$$

$$P \approx \underline{1342.71}$$

9% for 25 years has a higher monthly payment.

At 8%

(b) Total interest = 240 (1338.30) − 160000
= 161,192.00

At 9%

Total Interest = 300 (1342.71) − 1600
= 242,813.00

(c) Equity after 10 years at 8%

$$= 200000 - 1338.30\left[\frac{1-(1+0.08/12)^{-120}}{0.08/12}\right]$$

$$= \underline{89{,}695.33}$$

Equity after 10 years at 9%

$$= 200000 - 1342.71\left[\frac{1-(1+0.09/12)^{-180}}{0.09/12}\right]$$

$$= \underline{67{,}617.64}$$

The 9% loan has the highest total interest and smaller equity

(6)

Ex 5.4

1½ 21/ To find out how much is needed when he retires, John needs to find the present value of 360 payments of $300.

$$V = 300\left[\frac{1-\left(1+\frac{0.09}{12}\right)^{-360}}{0.09/12}\right]$$

$$\cancel{= 300\ (124.2818657)}$$

$$= 37,284.56$$

In order to accumulate this amount in 20 years (when he retires), he needs to find the monthly payments that will accumulate to $37,284.56 in 20 years.

$$37,284.56 = R\left[\frac{\left(1+0.09/12\right)^{240}-1}{0.09/12}\right]$$

$$\cancel{37,284.56 = R(667.8868699)}$$

$$R = \underline{\underline{55.82}}$$

26/ Ex 5.4

$V = ?$ , $R = 2247.57$ , $i = 0.07/12$ , $n = 300$

$$V = 2247.57\left[\frac{1-(1+0.07/12)^{-300}}{0.07/12}\right]$$

$$= 2247.57(141.4869004)$$

$$\approx \underline{\underline{318,001.71}}$$

The amount borrowed is \$318,001.71

$$\text{Total interest} = 300(2247.57) - 318,001.71$$

$$= \underline{\underline{356,269.29}}$$

Ex 5.4

30). size of the mortgage = $0.8 \times 150{,}000 = 120{,}000$

$$V = 120{,}000, \quad i = 0.105/12, \quad n = 12 \times 25 = 300$$

The monthly payment can be found by solving

$$120{,}000 = P\left[\frac{1-(1+0.105/12)^{-300}}{0.105/12}\right]$$

$$120{,}000 = P(105.9718170)$$

$$P = 1{,}133.02$$

After 96 payments, the owner still owes

$$V = 1{,}133.02\left[\frac{1-(1+0.105/12)^{-204}}{0.105/12}\right]$$

$$= 1133.02(94.95943683)$$

$$= 107{,}590.94$$

The owner will receive $0.8(300{,}000) - 107{,}590.94$

$$= \underline{\underline{132{,}409.06}}$$

Ex 8.4

32/ Amt. borrowed $= 180,000 - 60,000$
$= 120,000$

$V = 120,000$, $\quad i = 0.102/12$, $\quad n = 300$

To find the monthy payment $P$, solve

$$120000 = P\left[\frac{1-(1+0.102/12)^{-300}}{0.102/12}\right]$$

$$120000 = P(108.3614516)$$

$$P \cong \underline{\underline{1,107.40}}$$