

Full Solution

Write clear and well written solutions using the following problems. A communications grade out of 3 will be awarded for how well your math is presented.

4. Sam borrows \$8000 at 6.4%/a interest compounded quarterly for 25 years. How much money ^{does} ~~is in~~ Sam's ^{acc} account at the end of 25 years?

Given	want
$P = 8000$	A
$i = \frac{0.064}{4}$ $= 0.016$	
$n = (25)(4)$ $= 100$	

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

$$= 8000(1.016)^{100}$$

$$= \$39,125.58$$

∴ Sam owes \$39,125.58 at the end of 25 years. (Bad loan!)

5. Maria wants to have \$120 000 in her retirement account at the age of 65. If she is 20 years old now, how much must she invest at 3.5%/a compounded semi-annually to meet her goal?

Given	want
$A = 120\ 000$	P
$i = \frac{0.035}{2}$ $= 0.0175$	
$n = (45)(2)$ $= 90$	

$$P = \frac{A}{(1+i)^n} = \frac{120000}{(1.0175)^{90}}$$

$$= \$25\ 181.62$$

∴ Maria needs to invest \$25,181.62 today to have \$120,000 at age 65.

6. Chandra invests \$75 every month at 4.8%/a compounded monthly for 38 years. What is the total amount of Chandra's investments after 38 years, and how much interest does she earn?

Given	want
$R = 75$	FV. (ad I)
$i = \frac{0.048}{12} = 0.004$	
$n = (38)(12) = 456$	

$$FV = \frac{R[(1+i)^n - 1]}{i}$$

$$= \frac{(75)((1.004)^{456} - 1)}{0.004}$$

$$= 97\ 014.21$$

In total Chandra invested \$75 every month for 38 years (456 times)
 $\Rightarrow (75)(456) = \$34\ 200$
 ∴ The total interest is
 $I = 97\ 014.21 - 34\ 200 = \$62\ 814.21$

∴ After 38 years Chandra has 97,014.21

7. Joe borrowed \$330 000 from the bank to purchase a house. If the bank charges 6.12%/a compounded monthly, he will take 30 years to pay off the loan. What is Joe's **regular** mortgage payment? How much interest will he have paid over the term of the loan?

Given	want
$PV = 330\ 000$	R (ad I)
$i = \frac{0.0612}{12}$ $= 0.0051$	
$n = (30)(12) = 360$	

$$PV = \frac{R(1 - (1+i)^{-n})}{i}$$

$$\Rightarrow R = \frac{(PV)(i)}{[1 - (1+i)^{-n}]}$$

$$\Rightarrow R = \frac{(330\ 000)(0.0051)}{[1 - 1.0051^{-360}]}$$

$\Rightarrow \$2004.05$
 ∴ Joe pays \$2004.05 every month for his house.

In total Joe makes that payment 360 times.
 \Rightarrow Joe paid $(2004.05)(360) = \$721\ 458$

∴ He pays $I = 721\ 458 - 330\ 000 = \$391\ 458$ in interest.