Present Value - Principal that must be invested today to give a future amount

compound interest formula:

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

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

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

$$P = 6500(1+0.023)^{-6}$$

$$P = \$5671.00$$

$P = ?$

$i = \frac{4.6\%}{2}$ semi-annually

$\frac{0.046}{2}$

to have \$6500 3 yrs from now

$n = 6$

You want to go on a cruise 4yrs from now. You need ₦7500 What principal should be invested, at 8.4% per year compounded monthly

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

$P = 7500(1+0.007)^{-48}$

$P = ₦5365.95$

$A = 7500$

$i = \frac{0.084}{12}$

$i = 0.007$

$n = 4 \times 12$

Example 7.2.1

Nicathophie won the lottery! The lottery payment can be collected in one of two ways. Nicathophie can either take $1000 a week for 20 years, or he can take one lump sum payment today (or take a payment "presently"). What is the Present Value of the $1000 per week annuity assuming an interest rate of 8% compounded monthly?

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

$i = \frac{0.08}{12}$

$i = 0.006$

$n = (12)(20)$

$= 240$

$R = \$1000$

$$PV = 1000\left(\frac{1-(1+0.006)^{-240}}{0.006}\right)$$

$PV = \$119,199.08$

$1000 \times 52 \times 20 = 1,040,000$

Example 7.2.2

Danevaphia want to be able to withdraw $2500 a month, for 25 years, when she retires. How much money does Danevaphia need to have in an account which pays 4.8% interest compounded monthly in order to pay for her retirement annuity?

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

$R = 2500$

$i = 0.048 \div 12 = 0.004$

$n = 25 \times 12 = 300$

$$PV = 2500\left[\frac{1-(1+0.004)^{-300}}{0.004}\right]$$

$PV = 436,302.49$

Example 7.2.3

From your text: Pg 425 # 12

Jeongsoo borrows money to buy a computer. She will repay the loan by making monthly payments of $112.78 per month for the next 2 years at an interest rate of 7.75% per year compounded monthly.

a) How much did Jeongsoo borrow?

b) How much interest does Jeongsoo pay?

Example 7.2.3

From your text: Pg 425 # 12

Jeongsoo borrows money to buy a computer. She will repay the loan by making monthly payments of $112.78 per month for the next 2 years at an interest rate of 7.75% per year compounded monthly.

a) How much did Jeongsoo borrow?

b) How much interest does Jeongsoo pay?

$PV = \frac{112.78\left(1-\left(1.00645^{-24}\right)\right)}{0.006458}$

$PV = \$2499.93$

$R = \$112.78$

$C = 0.0775$

$n = 12$

$i = \frac{0.0775}{12} = 0.006458$

b)

$112.78 \times 24 = 2706.72$

$2706.72 - 2499.93 = \$206.79$ in interest

$n = 12 \times 2 = 24$

423

#2ac, 6cd, 7cd, 8, 9, 11a, 13