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REGISTRITION NO:- 18PWCSE1658

SECTION :- B

ASSIGNMENT NO:- 05

Date: __/__/__

Problem - 3.21

Given:

interest rate $i = 15\%$

Price $= \$100,000$

net income $= \$10,000$ per year

Periods $= N = 4$ years.

Required:

Salvage Value = ?

Solution:

Present worth $= P = 100,000(1+0.15)^4$

$\Rightarrow P = 100,000(1.15)^4$

$P = \$174,900.629$

Net income for 4-years:

$F = 100,00(1.15)^3 + 100,00(1.15)^2$
$+ 10,000(1.15)^1 + 10,000(1.15)^0$

$\Rightarrow F = \$49,933.75$

Market resale Price:

$S = P - F$

$S = 174.900.63 - 49,933.75$

$S = \$124,966.875$ Ans.

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Date: __/__/__

Problem 3.49

Given:

1st Year Payment = \$500

2nd Year payment = \$600

3rd Year Payment = \$700 & so on.

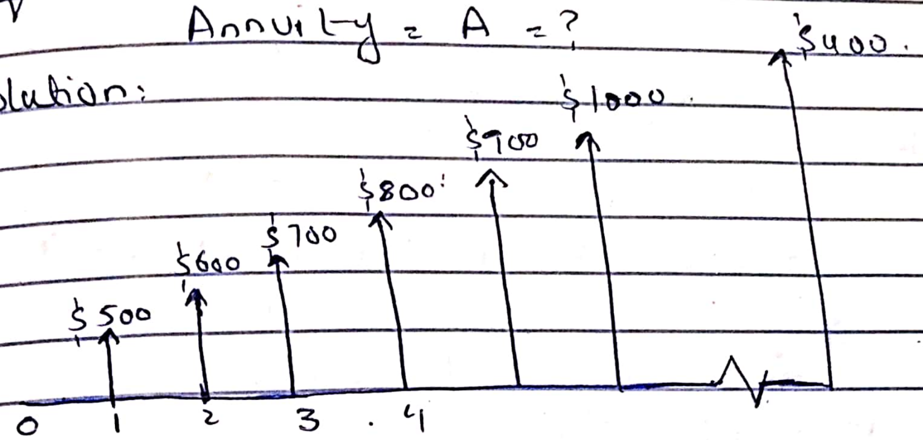
Number of Payments = 10.

interest rate = 8%.

Required:

Annuity = A = ?

Solution:



Step 1:-

Take \$500 as uniform series.

\$500 (P/A, 8%, 10)

Take \$100 as gradient series

\$100 (P/G, 10%, 10).

For \$500:

$$P_a = \$500 \left\{ \frac{(1+i)^N - 1}{i(1+i)^N} \right\}$$

$$\Rightarrow P_a = \$500 \left\{ \frac{(1.1)^{10} - 1}{0.1(1.1)^{10}} \right\}$$

Date: __/__/__

$P_a = 500(6.14)$

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$P_a = \$3070$

Now

For \$100:

$P_b = \$100(P/G, i\%, N)$

$$P_b = \$100\left\{\frac{(1+i)^N - iN - 1}{i^2(1+i)^{10}}\right\}$$

$$= \$100\left\{\frac{(1.1)^{10} - 0.1\times10 - 1}{(0.1)^2(1.1)^{10}}\right\}$$

$= \$100\{22.9\}$

$\$ = \$2290$

$\Rightarrow$ Present worth $= P_a + P_b$.

$\Rightarrow P = \$3070 + \$2290$.

$\Rightarrow P = \$5360$.

Now to find the Annuities we have.

$A = P(A/P, i\%, N)$.

$$= \$5360\left\{\frac{0.1\times(1.1)^{10}}{(1.1)-1}\right\}$$

$= \$5360(0.162)$

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Problem:- 3.51

Given:

Present worth $= P = \$10,000$

interest rate $= i = 10\%$.

Number of Periods $= N = 10$ years.

Required:

value of $Z = ?$

Solution:-

As the repayment starts at the end of 3 years. Thus we will first find the future worth of year 1

$$F = P(F/P, i\%, 1)$$
$$= \$10,000 \cdot (1+0.1)^1$$
$$= 10,000(1.1)$$
$$F = \$11.000$$

Now consider F as a present worth for the rest of years.

⇒ It is an asethemetic geometric

$$G = P(G/P, i\%, N) = P \cdot \left\{ \frac{i^2(1+i)^N}{(1+i)^N - iN - 1} \right\}$$

Here $N = N-1 = 9$ became the series starts at year 3.

Thus,

$$G = \$1100 \left\{ \frac{(0.1)^2 (1.1)^9}{(1.1)^9 - 0.1 \times 9 - 1} \right\}$$

Date: __/__/__

$G = \$11000\,(0.0514)$

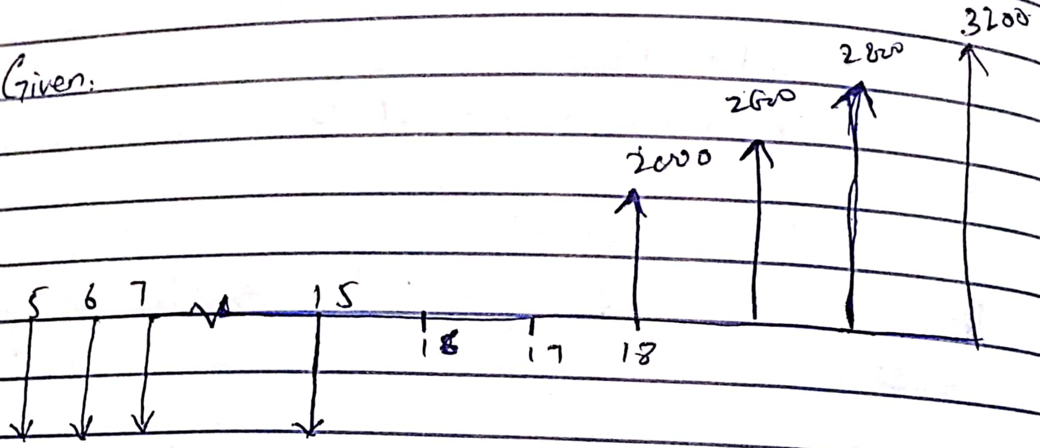
$G = \$566.38$

Just Replace G by Z.

$Z = \$566.38$ Ans.

Problem:- 3.59

Given:



Required:-

Amount deposited in year = 5-15

Solution:-

1st take \$2000 as uniform series & find its present worth.
2nd take 400 as geometric series.

Now;

$P_a = A(P/A\,;\,i\%\,,N)$.

$P_a = \$2000\,(P/A\,,10\%\,,4)$

$P_a = \$2000\,(3.17)$

$P_a = \$6339.7$

& $P_b = G(P/G, i\%, N)$

$= \$400(P/G, 10\%, 4)$.

$\Rightarrow P_b = \$400(4.38)$

$P_b = \$1751.24$

Now;

$P = P_a + P_b$.

$P = 6339.7 + 1751.3$.

$P = \$8091$

Now find its present worth 2 yea ahead.

$P = F(P/F, i\%, N)$

$= \$8091(P/F, 0.1\%, 2)$

$= \$8091(1.1)^{-2}$.

$P = \$6686.77$

Actually this is the future worth of the annuities.

Thus.

$A = F(A/F, i\%, N)$.

$= \$6686.77(A/F, 10\%, 11)$

$= \$6686.77(0.0539)$.

$A = \$360.83$.

He should be deposit \$360.88

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from 5 to 15 each year in order to withdraw the given amount.

Problem 3.74

Given:-

Present worth = P = \$ 50,000.

No of Payments Periods = 1 - K.

Number of Periods per payment.

a) $c = 1$ (annually) $\Rightarrow r = 5\frac{3}{8}\%$

b) $c = 4$ (Quarterly) $\Rightarrow r = 5\frac{1}{4}\%$

c) $c = \infty$ (continuously) $\Rightarrow r = 5\frac{1}{8}\%$

Required:-

Highest Return = ?

Solution:-

Case (a):-

As we Know that

$$i = \left[1 + \frac{r}{cK}\right]^c - 1$$

$$i = \left[1 + \frac{5.375\%}{1 \times 1}\right]^1 - 1$$

$$\Rightarrow i = [1 + 0.05375] - 1$$

$$i = 0.05375 \text{ Annually}$$

Now:-

$$F = P(F/P, i\%, N)$$

$F = 50,000(1+i)^N$
$F = 50,000(1.05375)$
$F = \$52687.5$

Case b -

$$i = \left[1 + \frac{r}{CK}\right]^C - 1$$

$$= \left[\frac{1+0.0125}{4\times1}\right]^4 - 1$$

$$i = 0.012$$

Now

$$F = P(F/P, i\%, N)$$

$F = \$50000(1+0.0125)^1$
$F = 50,000(1.0125)$
$F = \$50,625$

Case c)

As we know that

$$i = e^{r/k} - 1$$

$$i = e^{\left(\frac{5.125\%}{1}\right)} - 1$$

$$i = e^{5.125\%} - 1$$

$$i = e^{0.05125} - 1$$

$$i = 1.0525 - 1$$

$$i = 5.0528$$

Date: __/__/__

Now

$$F = P(F/P, i\%, N)$$

$$= \$50{,}000 \; (1+0.0525)^7$$

$$= 50{,}000 \; (1.0525)$$

So, she will select $5\frac{3}{8}\%$ interest rate (case a) b/c max returns she can get is this case

Problem 3.75

Given

a = 10% nominal interest = r/k.

b = 10% Quarterly

c) 10% Continuously

d) 10% weekly

Required:

Effective Interest.

Solution:-

Case a:-

As we have to find effective annual interest, thus $k=1$ for all the cases.

$$i = \left[1 + r/ck\right]^c - 1$$

$\frac{r}{k} = 10\%$, $C = 1$

$$i = (1.05)^2 - 1 = 0.1025.$$

$$i = 10.25\%.$$

Case b:-

$$i = \left[1 + \frac{r}{ck}\right]^{c} - 1$$

$$\frac{r}{k} = 10\%, \quad c = 4.$$

$$i = \left[1 + \frac{0.1}{4}\right]^{4} - 1$$

$$i = (1.025)^4 - 1 = 0.1038.$$

$$i = 10.38\%.$$

Case c:-

$$i = e^{r/k} - 1$$

$$i = e^{0.1} - 1$$

$$i = 0.1051.$$

$$i = 10.51\%.$$

Case d:-

$$i = \left[1 + \frac{r}{ck}\right]^{c} - 1 \;;\; r/k = 10\%, \; c = 52.$$

$$i = \left[1 + \frac{0.1}{52}\right]^{52} - 1$$

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$i = 1.1050 - 1 = 0.105$

$i = 10.5\%$

Problem:- 3.32

Given:

$PW = P = \$7500$.

$r/_{K} = 10\%$ Quaterly $\Rightarrow C = 4$.

Number of Periods $= N = 6$.

Required:-

Future worth = ?

Solution:-

1st Finding effective annual interest

$$i = \left[1 + \frac{r}{CK}\right]^{c} - 1$$

$$= \left[1 + \frac{0.1}{4}\right]^{4} - 1$$

$$i = (1.025)^{4} - 1$$

$$i = 0.1038$$

Now;

$$F = P(F/P, i\%, N)$$

$$F = \$7500(1 + 0.1038)^{6}$$

$F = \$7500 (1.808)$

$\boxed{F = \$13565.45}$ Ans.

Amount to be repaid = $13565.45.