

FN 1140

Assign # 2

Answer Key



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# CHAPTER 9 → CI

Ex 9.2 p331 #9

- A debt of \$800
- Interest @ 10% Semi Annually Feb 1 → Aug 1  
2017 2019
- @ 11% Quarterly Aug 2 → Nov 1  
2019 2022

What is the future value of debt?

PART 1 - Feb 1 → Aug 1 - Semiannual  
17 19 (2.5 yrs)

$$i = \frac{0.10}{2} = \underline{0.05}$$

$$N = 2.5 \text{ yrs} \times 2 \text{ pmts/yr} = \underline{5}$$

$$FV = PV(1+i)^N$$

$$FV = 800(1+0.05)^5 = \underline{1021.025}$$

∴ The value of the debt @ Aug 1/2019 is \$ 1021.03

PART 2 - Aug 2 → Nov 1  
2019 2022 (3.25 yrs)

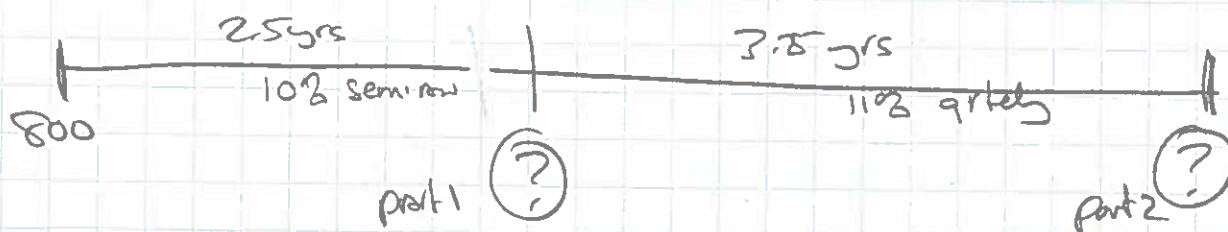
$$i = 0.11/4 = 0.0275$$

$$N = 3.25 \text{ yr} \times 4 \text{ pmt/yr} = \underline{13}$$

$$FV = PV(1+i)^N$$

$$FV = 1021.03(1+0.0275)^{13} = \underline{1452.78}$$

∴ The Accumulated debt on Nov 1, 2022 would be \$1452.78



Ex 9.4 p341 #131

Determine Proceeds =  $PV$   
Maturity Value =  $\$10,000$   
~~Discounted~~ 9%  
Compounded Monthly

22.5 months for Maturity Date

$$PV = FV(1+i)^{-N}$$

$$i = 9\% / 12 \text{ months} = 0.75\% / \text{month} = 0.0075$$

$$PV = 10000(1+0.0075)^{-22.5}$$

$$N = 22.5 \text{ months}$$

$$PV = 8452.56$$

$\therefore$  The proceeds of the investment ~~discounted~~ 22.5 months before the maturity would be \$8452.56

Chapter 11 Ex 11.2 p403 #7

Tom → Bart takes 120/mth → savings acct  
accnt earns 2.4% / compounded mthly  
8yrs Accumulate  
How much INTEREST?

PMT = 120 mthly  
Interest = 2.4%  
Compounds = 12/yr  
8yrs term

- Calculate FV of this Annuity
- PMTs & Compounds are the same so Simple Annuity

$$i = \frac{2.4}{12} = 0.2\% = 0.002$$

$$\# \text{ Compounds} = 8 \text{ yrs} \times 12/\text{yr} = 96$$

$$FV = PMT \left[ \frac{(1+i)^N - 1}{i} \right]$$

$$FV = 120 \left[ \frac{(1+0.002)^{96} - 1}{0.002} \right]$$

$$FV = 12,686.29$$

We have been asked to calculate the Accumulated interest so:

$$FV = 12686.29$$

$$- \text{sum of PMTs} = (120 \times 96 = 11,520)$$

$$\text{Accum Interest} = 12686.29 - 11,520 = \$ \underline{\underline{1166.29}}$$

Chapter 11 - 11.3 p 412 #7 ~~Rate~~

Bonus?

Invested earns 4.18% - computer monthly  
Drew \$343 mth for 8 yrs  $\rightarrow$  all gone.

Ⓐ Value of Bonus?

Calculate the PV of sum of pmts of \$343 mth  
for 8 yrs @ 4.18%

Pmts / Compounds are the same so Simple Ann

Step 1  
PV  
of Stream

$$\begin{aligned} PV &= PMT \left[ \frac{1 - (1+i)^{-N}}{i} \right] \\ &= 343 \left[ \frac{1 - (1 + 0.00348)^{-96}}{0.00348} \right] \\ &= \$27,947.10 \end{aligned}$$

$\therefore$  the Bonus was \$27,947.10

Ⓑ

TOTAL INTEREST

$$\rightarrow PV = 27,947.10$$

$$\text{Value of Stream} = (343 \times 96 = 32,928)$$

$$\text{So } 32,928 - 27,947.10 = 4,980.85 \text{ interest paid}$$

Ⓒ Assume Rate of ~~Interest~~ = 4.31%

$$PV = \frac{27,809.29 - \text{new rate}}{27,947.10 - \text{original rate}}$$

$$\text{Diff} = \$137.89 \text{ less if rate diff}$$



Chapter 12 - Ex 12.1 p 440 #8

Ms Cook

Deposits \$950 - end of  
15 yrs

Interest = 3% compounded monthly  
after 10 yrs - how much is it worth.

→ So  
PART 1 → Calculate the FV of Annuity in 15 yrs  
→ Payments; Compds are different so General Annuity

pmt = 2  
Compds = 12

$$FV_1 = PMT \left[ \frac{(1+p)^N - 1}{p} \right]$$

$$p = (1+i)^c - 1$$

$$c = 12/2 = 6$$

$$\text{So } p = (1 + 0.015)^6 - 1$$

$$p = 0.01509$$

$$i = 3\%/12 = 0.0025$$

$$p = (1 + 0.0025)^6 - 1$$

$$p = 0.01509$$

$$FV = 950 \left[ \frac{(1 + 0.015)^{30} - 1}{0.015} \right]$$

$$N = 30$$

$$FV = \$35,713.39 \rightarrow \text{value in 15 yrs.}$$

Part 2

So the 35,713.39 is then held for another  
10 yrs, earning 3% compounded monthly - calculate the  
FV of that.

$$i = 3\%/12 = 0.0025$$

$$FV = PV(1+i)^N$$

$$N = 12 \times 10 = 120$$

$$FV = 35,713.39(1 + 0.0025)^{120}$$

$$FV = 48,189.99 \rightarrow \text{this is the value @ end of 10 more yrs.}$$

Ex 12.2 p 443 #9

Dale  
Purchased Retirement Annuity for \$1800 every 6 mths / 20 yrs  
Interest = 4.6% compounded monthly

How much Did Dale invest?

$$PMT = 1800$$

$$Interest = 4.6 \rightarrow 4.6/12 = 0.003833$$

$$C = 12/2 = 6$$

$$P = (1 + 0.003833)^6 - 1 = 0.023221546$$

$$N = 20 \text{ yr} \times 2 = 40$$

$$PV = PMT \left[ \frac{1 - (1 + p)^{-N}}{p} \right]$$

$$PV = 1800 \left[ \frac{1 - (1 + 0.0232215)^{-40}}{0.0232215} \right]$$

$$PV = \$ \underline{46,568.95} \rightarrow \text{Dale invests this much into the annuity}$$

Chapter 13 - Ex 13.2 p484 #7

Traders Credit

lease value @ \$5400 (PV)

Pmts @ Begins 5 mths for 3 yrs (Annuity due)

Interest = 5.5% / year  $= i = 5.5\% / 4 = 0.01375$

$$C = \frac{4}{12} = 0.33$$

Size of PMT?

$$P = (1+i)^C - 1$$

$$P = (1+0.01375)^{0.33} - 1$$

$$P = 0.00456$$

Annuity due  
monthly pmts - quarterly compounding so General Annuity due.

$$PV_{(Gen)}^{due} = PMT \left[ \frac{1 - (1+p)^{-N}}{p} \right] (1+p)$$

$$5400 = PMT \left[ \frac{1 - (1+0.00456)^{-36}}{0.00456} \right] (1+0.00456)$$

$$5400 = PMT (33.28)$$

$$PMT = \frac{5400}{33.28}$$

$$PMT = 162.26 \rightarrow \text{Amt of } \underline{PMT}$$

PMT



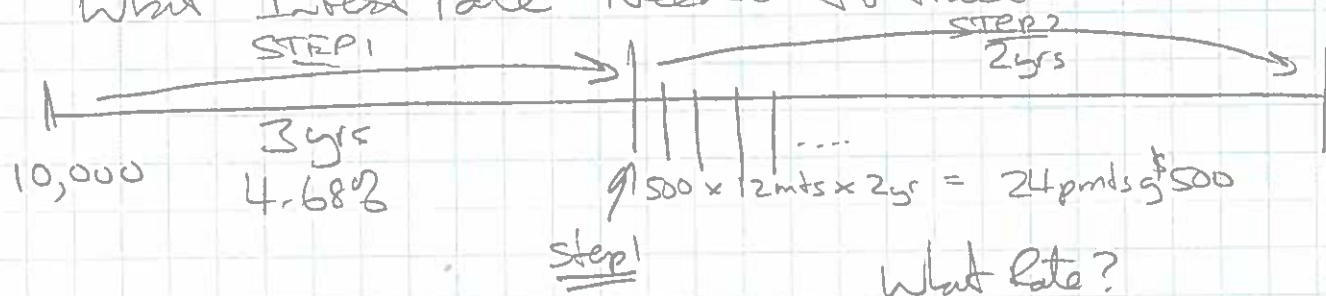
Chapter 13 - 13.3 p493 #7

Samantha

w/ \$500 end of each mth for 2 yrs  
Starting in 3 yrs from now

if she invests \$10000 now @ 4.68% comp/mth

What Interest rate needed to fund?



STEP 1

$$FV \text{ of } 10000 \text{ in } 3 \text{ yrs @ } 4.68\%$$

$$= FV = PV (1+i)^n$$

$$= 10000 (1 + 0.0039)^{36}$$

$$\rightarrow i = \frac{4.68}{12} = 0.39$$

$$i = 0.0039$$

$$N = 36 \text{ pmts}$$

$$FV = 11,504.20$$

i.e. the value of the investment in 3 yrs from now is \$11,504.20

Step 2 → 11,504.20 is PV of 2 yrs worth of fund mng  
→ Pmts/Compd differ so general.

$$PV_0 = PMT \left( \frac{1 - (1+i)^{-n}}{i} \right)$$

Solve for i

$$11504.20 = 500 \left( \frac{1 - (1+i)^{-24}}{i} \right)$$

$$11504.20i = 500i (1 - (1+i)^{-24})$$

mult  
alg by i

Divide Both sides by 500:

$$23.0084 = \frac{1 - (1+i)^{-24}}{i}$$

Mult Both sides by  $i$

$$23.0084i = 1 - (1+i)^{-24}$$

$$i = 0.0034$$

There are 12 compds a yr so

$$i \times 12 = \text{Annual Rate}$$

$$0.0034 \times 12 = \underline{\underline{4.08\%}}$$

∴ She would require 4.08% to have enough \$ to draw down 500/mo for 2 yrs

Chapter 13 - 13.5 #5 Municipal. p 508

city sales 13000 every 6 mths indefinitely (perpetuity)  
interest = 4.75%  $4.75/4 =$   
compounded quarterly

How much should city put in

$$PV = \frac{pmt}{r}$$

$$P = (1+i)^c - 1$$

$$c = \frac{4 \text{ comp'd}}{2 \text{ pmts}} = 2$$

$$= \frac{13000}{0.023891016}$$

$$P = \frac{(1+0.011875)^2 - 1}{0.023891016}$$

$$= 544,137.60$$

City should put in \$544,137.60