

Date: \_\_\_\_\_

## Today's Learning Goal(s):

By the end of the class, I will be:

- a) ready for the Unit 8 Summative.

Correct: pp. 534-535 #1 – 15, 17 <sup>7</sup> -4, 3, 6, 8  
p. 536 #1 – 3 [5]

Today's Homework Practice includes:

Be fully prepared for  
Thursday's **Unit 8 Summave !**

## Formulae

### Simple Interest

$$I = Prt$$

$$A = P(1 + rt)$$

### Annuity

$$S_n = \frac{a(r^n - 1)}{r - 1}$$

$$A = P + I$$

$$I = A - P$$

### Compound Interest

$$A = P(1 + i)^n \quad \text{Future Value}$$

$$P = \frac{A}{(1 + i)^n} \quad \text{Present Value}$$

### Future Value

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

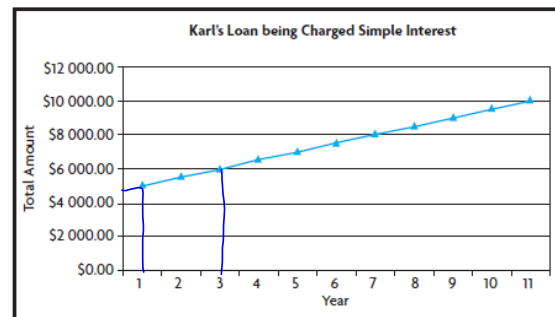
### Present Value

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

p. 534

3. Karl borrows some money and is charged simple interest. The graph below shows how the amount he owes grows over time.

- How much did Karl borrow?
- What annual interest rate is he being charged?
- How long will it take before he owes \$20 000?



$$\begin{array}{l}
 3 \text{ a) } P = 5000 \text{ (from Graph)} \\
 \text{b) after 2 years, } A = 6000 \\
 \therefore I = 1000 \\
 1000 = 5000r(2) \\
 \frac{1000}{5000(2)} = r \\
 r = 0.1 \\
 = 10\% / \text{a}
 \end{array}
 \quad
 \begin{array}{l}
 \text{c) } A = P(1 + rt) \\
 20000 = 5000(1 + 0.1t) \\
 4 = 1 + 0.1t \\
 \frac{3}{0.1} = t \\
 t = 30 \text{ years}
 \end{array}$$

p. 534

4. Isabelle invests \$4350 at 7.6%/a compounded quarterly. How long will it take for her investment to grow to \$10 000?

$$\begin{aligned}
 4. \quad A &= 10000 & 10000 &= 4350 \left(1 + \frac{0.076}{4}\right)^{4n} \\
 P &= 4350 & \frac{10000}{4350} &= 1.019^{4n} \\
 i &= \frac{0.076}{4} & 4n &= \frac{\log\left(\frac{10000}{4350}\right)}{\log 1.019} \\
 n &= 4x \text{ (quarters)} & &= 44.2259 \\
 & & & n = 11.056 \text{ years}
 \end{aligned}$$

6. Deana invests some money that earns interest compounded annually. At the end of the first year, she earns \$400 in interest. At the end of the second year, she earns \$432 in interest.

- What interest rate, compounded annually, is Deana earning? Round your answer to two decimal places.
- How much did she invest?

$$\begin{aligned}
 6. \text{ Compounded annually} \\
 I: 0, 400, 432 & \quad b) \text{ first year annually} \\
 a) \quad r &= \frac{432}{400} & \text{Same as simple Int.} \\
 &= 1.08 & 400 = P(0.08)(1) \\
 \therefore 8.00\%/a & & P = \$5000
 \end{aligned}$$

- p. 534 7. Vlad purchased some furniture for his apartment. The total cost was \$2942.37. He paid \$850 down and financed the rest for 18 months. At the end of the finance period, Vlad owed \$2147.48. What annual interest rate, compounded monthly, was he being charged? Round your answer to two decimal places.

7. \$2942.37; paid \$850 down  $i = \frac{r}{12}$

$\therefore P = 2092.37$ ; 18 months; comp. monthly

$$2147.48 = 2092.37 \left(1 + \frac{r}{12}\right)^{18}$$

$$\sqrt[18]{\frac{2147.48}{2092.37}} - 1 = \frac{r}{12}$$

$$r = 0.0173443$$

$$\hat{=} 1.73\% / a$$

$$r = 12 \left[ \sqrt[18]{\frac{2147.48}{2092.37}} - 1 \right]$$

8. Calculate the present value of each investment.

|    | Rate of Compound Interest per Year | Compounding Period | Time      | Future Value |
|----|------------------------------------|--------------------|-----------|--------------|
| a) | 6.7%                               | annually           | 5 years   | \$8 000      |
| b) | 8.8%                               | semi-annually      | 2.5 years | \$1 280      |
| c) | 5.6%                               | quarterly          | 8 years   | \$100 000    |
| d) | 24.6%                              | monthly            | 1.5 years | \$850        |

8a)  $A = 8000$   $P = \frac{8000}{(1 + 0.067)^5}$

$P = ?$   $\hat{=} 5784.527$

$i = \frac{0.067}{1}$   $\hat{=} \$5784.53$

$t = 5 \times 1$

b)  $P = \frac{1280}{\left(1 + \frac{0.088}{2}\right)^{2.5 \times 2}}$

$\hat{=} 1032.066$

$\hat{=} \$1032.07$

8c)  $P = \frac{100\,000}{\left(1 + \frac{0.056}{4}\right)^{8 \times 4}}$

$\hat{=} 64\,089.287$

$\hat{=} \$64\,089.29$

8d)  $P = \frac{850}{\left(1 + \frac{0.246}{12}\right)^{1.5 \times 12}}$

$\hat{=} 589.908$

$\hat{=} \$589.91$

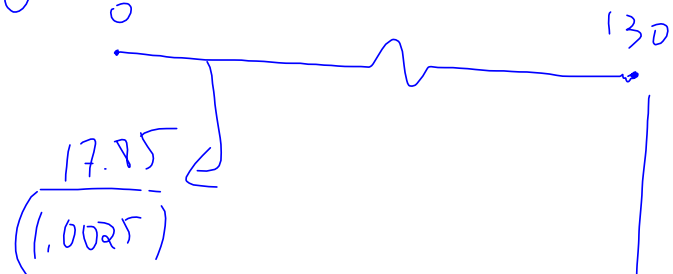
- p. 535 20. Kevin purchases a guitar on a payment plan of \$17.85 per week for  $2\frac{1}{2}$  years at 13%/a compounded weekly. What was the selling price of the guitar?

$$i = \frac{0.13}{52}$$

$$= 0.0025$$

$$n = 2.5 \times 52$$

$$= 130$$



$$a = \frac{17.85}{(1.0025)^{130}}$$

$$S_{130} = \frac{\frac{17.85}{(1.0025)^{130}} \left( (1.0025)^{130} - 1 \right)}{0.0025}$$

$$\doteq 1979.06$$

## Self-Test

- p. 536 3. Betsy inherits \$15 000 and would like to put some of it away for a down payment on a house in 8 years. If she would like to have \$25 000 for the down payment, how much of her inheritance must she invest at 9.2%/a compounded quarterly?

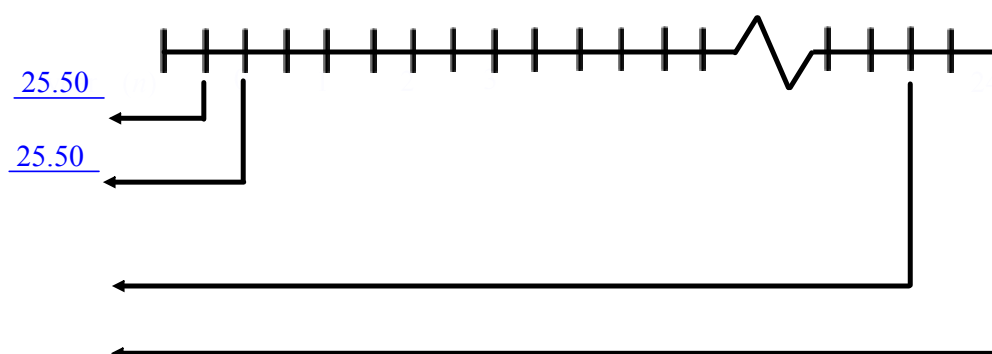
|    |                       |   |
|----|-----------------------|---|
| 3. | $A = 25000$           | $P = 25000$   |
|    | $P = ?$               | $\frac{25000}{\left(1 + \frac{0.092}{4}\right)^{32}}$ |
|    | $i = \frac{0.092}{4}$ | $\doteq 12075.906$                                    |
|    | $n = 8 \times 4$      | $\doteq \$12075.91$                                   |
|    | $= 32$                |   |

p. 520 #3c

3. Calculate the present value of each annuity.

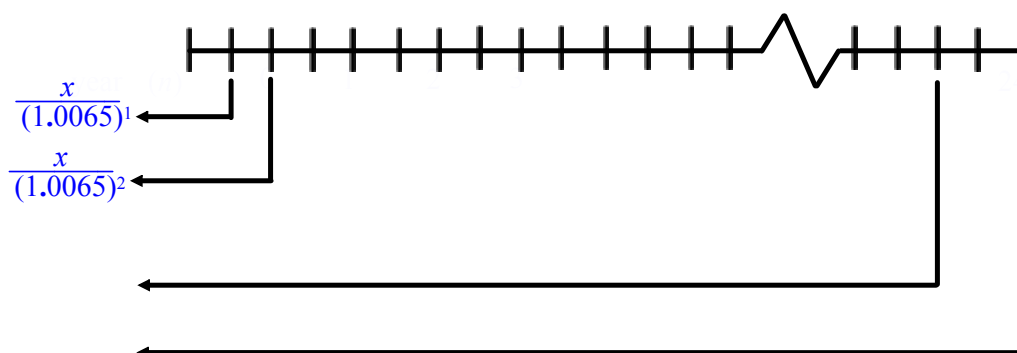
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|    | Regular Payment      | Rate of Compound Interest per Year | Compounding Period | Time      |
|----|----------------------|------------------------------------|--------------------|-----------|
| a) | \$5000 per year      | 7.2%                               | annually           | 5 years   |
| b) | \$250 every 6 months | 4.8%                               | semi-annually      | 12 years  |
| c) | \$25.50 per week     | 5.2%                               | weekly             | 100 weeks |



p. 521 #7

7. Emily is investing \$128 000 at 7.8%/a compounded monthly. She wants to withdraw an equal amount from this investment each month for the next 25 years as spending money. What is the most she can take out each month?



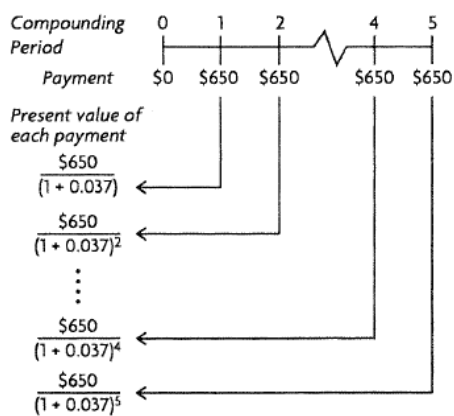


p. 534 #9

9. Roberto financed a purchase at 9.6%/a compounded monthly for 2.5 years. At the end of the financing period, he ~~still~~ owed \$847.53. How much money did Roberto borrow?

### 8.5 Annuities: Present Value, pp. 520–522

1. a) i) There are 5 payments:  $i = 3.7\%/a$  compounded annually



ii)  $PV = 650(1.037)^{-1} + 650(1.037)^{-2} + 650(1.037)^{-3} + \dots + 650(1.037)^{-5}$

iii)  $PV = 650 \times \frac{1 - 1.037^{-5}}{0.037} = \$2918.24$

$$PV = \frac{650}{1.037^5} + \frac{650}{1.037^4} + \frac{650}{1.037^3} + \frac{650}{1.037^2} + \frac{650}{1.037^1}$$

$$d = \frac{650}{1.037^5} \quad r = 1.037$$