Teacher: **Mrs. Roen**   *Unit:* **Annuities and Mortgages**

Course: **MAP 4C**   *Lesson:* **6– 3 Present Value of an Annuity**

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◆ *Homework Check:* **Lesson 6 - 3**

◆ *Note:* **Present Value of an Annuity**

     The present value of an ordinary simple annuity is the principal value that must be invested today in order to accumulate the amount necessary in the time given to provide regular payments required. The formula is just a bit different from the amount formula as follows:

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

Where PV is the amount that must be invested today in order to provide the regular payments needed. The other variables are still used as before. For example,

     Josie wants to be able to withdraw \$1000 a month in her retirement in 25 years. How much will she need to invest today at 5% interest compounded monthly in order to accomplish this goal?

$$\frac{0.05}{12} = 0.004166667$$

$$n = 25(12) = 300$$

$$PV = \frac{1000\left[1-(1+0.004166667)^{-300}\right]}{0.004166667}$$

$$PV = \$171060.05$$

Therefore, Josie must invest \$ 171060.05 in order to retire in 25 years and withdraw \$1000 a month.

◆ *Homework:* **Lesson 6 – 3**

Lesson 6 – 3:

1. Evaluate each expression to the nearest 2 decimal places. (4 marks)

a) $\dfrac{45\left[1-(1+.02)^{-24}\right]}{0.02} =$

b) $\dfrac{575\left[1-(1+0.003)^{-48}\right]}{0.003} =$

c) $\dfrac{2000\left[1-(1+0.0065)^{-14}\right]}{0.0065} =$

d) $\dfrac{95\left[1-(1+0.12)^{-8}\right]}{0.12} =$

2. Use the formula $PV = \dfrac{R\left[1-(1+i)^{-n}\right]}{i}$ **, to calculate the present value for each investment. (8 marks)**

a) $R = \$200, i = 0.05, n = 3$

b) $R = \$1000, i = 0.08, n = 7$

c) $R = \$750, i = 0.02, n = 12$

d) $R = \$50, i = 0.003, n = 48$

3. Use the present value formula to complete the chart. (8 marks)

Payment	Interest rate	Frequency of compounding	Length of annuity	Present value
$300	12%	monthly	2 years	
$500	4%	semi-annually	6 years	
$900	9%	monthly	4 years	
$800	8%	quarterly	5 years	

4. Determine the amount of each present value. Use a 4% interest rate. (12 marks)
a) **payments of $75 for 10 years compounded annually   b) payments of $240 for 15 year semi-annually**

c) payments of $250 for 4 years compounded quarterly d) payments of $300 for 4.5 years monthly

5. Isabel receives a disability settlement from an accident. She must choose one of these payment plans.
a) a single cash payment of $80 000   or   b) monthly payments of $1200 for 10 years
If Isabel can invest the monthly payment at 4.8% compounded monthly, which settlement do you think Isabel should accept? (3 marks)

6. Terrance borrows money to buy a truck. He will repay the loan by making monthly payments of $112.78 per month for the next 3 years at an interest rate of 4.8% compounded monthly. (4 marks)
a) How much did Terrance borrow?   b) How much money did Terrance borrow?

7. Angela's annuity pays $600 per monthly for 5 years at 9% per year compounded monthly. Becky's annuity pays $300 per month for 10 years at 9% per year compounded monthly. The total of the regular payments is the same for each annuity, but which annuity has the higher present value? (4 marks)
Angela: Becky:

8. Noah wins a talent contest. The prize is a combination of a monthly payment of $1000 for 2 years, and then $500 for the next 3 years. If the contest organizers invested at 8% compounded monthly, how much did they deposit? (5 marks)