Grade

Grade out of 37

14.00

Current grade in gradebook

14.00

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I can see you put a lot of effort into this assignment, but you struggled quite a bit. You have used the future value of an annuity formula, but you should have used the rearranged present value of an annuity formula. This was the case for all four major calculations, which lead you to incorrect and illogical conclusions for the last part. Make sure you know that if you pay a mortgage off in a shorter amount of time you will pay less money overall even though your monthly payments will be greater. Also make sure you know that if you have a larger downpayment you will pay less overall than with a smaller downpayment.

I'm attached a photo for you to see what formula you should have used for both the mortgage payment and the income needed to afford the house. Note that the mortgage payment is the principal and interest combined. Each of these vary slightly each month, but they always add to the same amount.

Please make sure you understand all the feedback I'm giving you and ask me any questions you don't understand.

Path: p

14

2.7 Evaluation: Ordinary Simple Annuities: Mortgage Assignment

COMMUNICATION 4 /11	THINKING 10 /26

THINKING 26 MARKS

Instructions:

You are to research a house in either your area, or an area that you would like to live (ex. another country, city, province etc.). When you have the advertisement of your chosen house, copy and paste the advertisement, along with the URL link for your dream home in a word document to submit. The advertisement should include the address, price and the number of bedrooms and bathrooms.

For houses in Canada, you may find it useful to use realtor.ca or commfree.com.

Marking Scheme (4 marks)

4

- 4 marks for attaching the house advertisement including the address, price and the number of bedrooms and bathrooms

A **down payment** is an initial amount that you pay when you buy something on credit. It is custom in Canada to put a minimum of 5% "down" on a house, in order to protect yourself and the banks against market fluctuations, in the case of a forced sale.

The **mortgage amount** is the sale price of the house minus the down payment. This is the amount being borrowed.

Payments are commonly made monthly, bi-weekly or weekly. Since payments are made on the decreasing mortgage amount, a mortgage is a type of **simple annuity.**

In order to be approved for a mortgage, two main things have to fall into place: good credit and enough income to cover the debt.

The amount of **income required** to be approved for a mortgage is based on **GDSR**, gross debt service ratio. This means that an individual's debt payments (mortgage) can only account for 35% of their income. The ratio is calculated using the formula $\frac{principal+interest+taxes+heat}{gross\ income}$. For the scope of this assignment, we will use 0.5% of the house amount for the cost of the property tax and $100 per month for heat.

Complete the following questions and submit these papers along with the attached advertisement.

Marking Scheme (total of 22 marks)

6

- 1 mark for listing the price of the house
- 1 mark for calculating the down payment (2 marks total)
- 1 mark for calculating the mortgage amount after the down payment (2 marks total)
- 3 marks for calculating the mortgage payment manually (12 marks total)
- 1 mark for calculating the property tax on the house
- 2 marks for calculating the income needed to be approved for the mortgage (4 marks total)

Option 1:

What is the price of the house?

$462,000

If you wanted to put a 5% down payment on the house, what amount would this be?

462000 × 5% = $23,100

After the 5% down payment, what is the mortgage amount?

$462,000 − $23,100 = $438,900

Calculate the payment, "R," if the mortgage is paid **monthly** at an annual interest rate of 4.44% for 25 years.

Simple Annuities.

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

$$438900 = \frac{R[(1+\frac{0.0444}{12})^{300} - 1]}{\frac{0.0444}{12}}$$

$$0 = \frac{R[(1+0.0037)^{300} - 1]}{0.0037 \cdot 438900}$$

$R = 800.70$

Calculate the payment, "R," if the mortgage is paid **monthly** at an annual interest rate of 4.44% for 20 years.

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

$$438900 = \frac{R[(1+\frac{4.44\%}{12})^{240} - 1]}{\frac{4.44\%}{12}}$$

$R = 1138.57$

You must use present value of an annuity not future value

What is the cost of the property tax, based on 0.5% of the price of the house?

462000 × 0.5% = $2310

What would your income need to be in order to afford this house (given that you have no other debts)?

~~$462000 + $2310 = $464.310.~~

25 years 35% $= \frac{462000 + 240210 + 2310 + 100 \times 25 \times 12}{X}$

$X = \$2098625.571$

20 years 35% $= \frac{462000 + 273256.8 + 2310 + 100 \times 25 \times 12}{X}$

$X = 2235305.143$

Option 2:

What is the price of the house (same as above)?

$462060

If you wanted to put a 20% down payment on the house, what amount would this be?

$462000 × 20% = $92400 ✓

After the 20% down payment, what is the mortgage amount?

$462000 − $92400 = $369600 ✓

Calculate the payment, "R," if the mortgage is paid monthly at an annual interest rate of 4.44% for 25 years.

Simple Annuities.

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

$$369600 = \frac{R[(1+\frac{4.44\%}{12})^{300} - 1]}{\frac{4.44\%}{12}}$$

R = 674.27 ✗ -3

Calculate the payment, "R," if the mortgage is paid monthly at an annual interest rate of 4.44% for 20 years.

Simple Annuities

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

$$369600 = \frac{R[(1+\frac{4.44\%}{12})^{240} - 1]}{\frac{4.44\%}{12}}$$

R = 958.80 ✗ -3

What is the cost of the property tax, based on 0.5% of the price of the house?

462000 × 0.5% = $2310.

What would your income need to be in order to afford this house (given that you have no other debts)?

~~$462000 ÷ $2310 = $464.310~~

25 years $35\% = \frac{462000 + 20228 + 2310 + 100 \times 25 \times 12}{x}$

$x = \$1990260$ ✗

20 years $35\% = \frac{462000 + 2310 \times 12 + 2310 \times 100 \times 25 \times 12}{x}$

$x = \$2076920$ ✗ -2

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COMMUNICATION — 11 MARKS — 4

Complete the following questions:

Marking Scheme (total 11 marks)

- 2 marks for valid and thoughtful reasons why you chose this house
- 1 mark for each calculation on the differences (total 3 marks)
- 2 marks for each explanation of your opinion on the difference (total 6 marks)

2 ✓

Why did you choose this house?

The house th plus the garden has a total area of 624 square meters. It has a garage and a toilet and is air-conditioned. Three bedrooms and a new kitchen. Lakes and Toronto's central business district are five minutes away. have beautiful environment.

1 2 ?

For the 5% down payment opinion, what is the difference in the payment amount between paying your mortgage off in 20 years and 25 years? What is your opinion on this difference?
(Hint: Compare Option 1 at 20 years and Option 1 at 25 years)

1138.57 7800.7

The mortgage off 20 years is more than the mortgage off 25 years of one month mortgage. The total of mortgage 25years: 800.7×25×12=240210 1138.57×20×12=273256.8 200175<227714 The total mortgage payment in 25 years is less than the monthly mortgage payment in 20 years. So ~~it i~~ recommended to choose 25 years. ok

This is based on incorrect calculations and is not logical

1 −2

For the 20% down payment opinion, what is the difference in the payment amount between paying your mortgage off in 20 years and 25 years? What is your opinion on this difference?
(Hint: Compare Option 2 at 20 years and Option 2 at 25 years)

958.80 674.27 The mortgage off in 20 years is more than the mortgage off in 25 year of monthly. 958.80×20×12=230112 674.27×25×12=202281 230112>202281 ok

The total mortgage payment in 25 years is less than the mortgage payment in 20 years and the monthly mortgage payment in 25 years is less than the monthly mortgage payment in 20 years. So recommended to choose 25 years same as above

What is the difference in the payment based on whether you put 5% down or 20% down? What is your opinion on this difference?
(Hint: Compare Option 1 at 5% down payment and Option 2 at 10% down payment)

5% 20% X

	5%		20%
monthly mortgage payment in 25 years.	800.70	>	674.27
monthly mortgage payment in 20 years	1138.57	>	958.80
total mortgage payment in 25 years.	240210	>	202281
total mortgage payment in 20 years	273256.8	>	230112

3

total expand 2633/0.

5% 25 years 240210 + 23/100 × 2633/0 = 240683.9

5% 20 years 273256.8 + 23/100 × 2633/0 = 296356.8

20% 25 years 202281.+92400. = 294681

20% 20 years 230112.+92406 = 322512.

Page 4 of 4

It can be concluded from the above information that the monthly mortgage payment and total mortgage payment with a down payment of 5% are less that the monthly mortgage payment and total mortgage payment with a down payment of 20%, so it can be concluded that the down payment of 5% should be chosen

These numbers aren't right so the conclusions are all wrong.

Option 1:

What is the price of the house? 1 mark

If you wanted to put a 5% down payment on the house, what amount would this be? 1 mark

After the 5% down payment, what is the mortgage amount? 1 mark

Calculate the payment, "R," if the mortgage is paid **monthly** at an annual interest rate of 4.44% for 25 years. 3 marks

* Present Value of an Annuity

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

$$R = \frac{\text{mortgage amount}}{\left(\frac{1-(1+\frac{0.0444}{12})^{-25\times 12}}{(\frac{0.0444}{12})}\right)}$$

* n = 300

Calculate the payment, "R," if the mortgage is paid **monthly** at an annual interest rate of 4.44% for 20 years. 3 marks

* n = 240

What is the cost of the property tax, based on 0.5% of the price of the house? 1 mark

What would your income need to be in order to afford this house (given that you have no other debts)? 2 marks

$$\frac{R + \frac{\text{taxes}}{12} + 100}{\text{gross income}} = 0.35$$

* do twice

$$\text{gross income} = \frac{R + \frac{\text{taxes}}{12} + 100}{0.35}$$