Math 1080 Mortgage Project

Group _____ Names of Participants _____
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Instructions: One group member should fill in sheet using dark pencil or ink, showing steps in the provided work space and answers in answer spaces. Group members must work together to assure correct solutions. The final work shown should be split among group members with each group member providing the work and solution for part of the project. Participants' initials should appear to the right of their work/solutions.

In this project we will examine a home loan or mortgage. Assume that you have found a home for sale and have agreed to a purchase price of $201,000.

Down Payment: You are going to make a 10% down payment on the house. Determine the amount of your down payment and the balance to finance.

Down Payment_____ Mortgage Amount_____

Part I: 30 year Mortgage

Monthly Payment: Calculate the monthly payment for a 30 year loan (rounding up to the nearest cent) by using the following formula. **Show your work**. [PMT is the monthly loan payment, *P* is the mortgage amount, *r* is the annual percent rate for the loan *in decimal*, and *Y* is the number of years to pay off the loan.] For the 30 year loan use an annual interest rate of 4.975%.

$$PMT = \frac{P\left(\frac{r}{12}\right)}{1-\left(1+\frac{r}{12}\right)^{-12Y}}$$

Write down values you used: P = _____, r = _____, Y = _____

Monthly Payment for a 30 year mortgage _____

Note that this monthly payment covers only the interest and the principal on the loan. It **does not cover** any insurance or taxes on the property.

Amortization Schedule: In order to summarize all the information regarding the amortization of a loan, construct a schedule that keeps track of the payment number, the principal paid, the interest, and the unpaid balance. A spreadsheet program is an excellent tool to develop an amortization schedule. We can use a free amortization spreadsheet on the web.
The web address is: http://www.bretwhissel.net/amortization/amortize.html. Enter the **amount of the loan**, i.e. the selling price minus the down payment, the **interest rate**, and the appropriate **number of years.** Check the box to show the schedule.

Amortization Schedule monthly payment for a 30 year mortgage _____
(Note: if this is more than 2 or 3 cents different from your calculation, check your numbers!)

Total interest paid over 30 years_____

Total amount paid _____

Notice that the amount of the payment that goes towards the principal and the amount that goes towards the interest are not constant. What do you observe about each of these values?

Number of first payment when more of payment goes toward principal than interest _____

As already mentioned, these payments are for principal and interest only. You will also have monthly payments for home insurance and property taxes. In addition, it is helpful to have money left over for those little luxuries like electricity, running water, and food. As a wise home owner, you decide that your monthly principal and interest payment should not exceed 35% of your monthly take-home pay. What minimum monthly take-home pay should you have in order to meet this goal?

Minimum monthly take home pay = _____.

It is also important to note that your net or take-home pay (after taxes) is less than your gross pay (before taxes). Assuming that your net pay is 73% of your gross pay, what minimum gross annual salary will you need to make to have the monthly net salary stated above?

Minimum gross annual salary = _____

Part II: Selling the House

Let's suppose that after living in the house for 10 years, you want to sell. The economy experiences ups and downs, but in general the value of real estate increases over time. To calculate the value of an investment such as real estate, we use continuously compounded interest.

Find the value of the home 10 years after purchase assuming a continuous interest rate of 4%. Use the full purchase price as the principal.

Value of home 10 years after purchase _____

Assuming that you can sell the house for this amount, use the following information to calculate your gains or losses:

Selling price of your house _____

Original down payment _____

Mortgage paid over the ten years _____

The principal balance on your loan after ten years _____

Do you gain or lose money over the 10 years? How much? Show your amounts and summarize your results:

Part III: 15 year Mortgage

Using the same purchase price and down payment, we will investigate a 15 year mortgage.

Monthly Payment: Calculate the monthly payment for a 15 year loan (rounding up to the nearest cent) by using the following formula. Show your work! [PMT is the monthly loan payment, *P* is the mortgage amount, *r* is the annual percent rate for the loan *in decimal*, and *Y* is the number of years to pay off the loan.] For the 15 year loan use an annual interest rate of 4.735%.

$$PMT = \frac{P\left(\frac{r}{12}\right)}{1-\left(1+\frac{r}{12}\right)^{-12Y}}$$

Write down values you used: P = _____, r = _____, Y = _____

Monthly Payment for a 15 year mortgage = _____

Use the amortization spreadsheet on the web again, this time entering the interest rate and number of payments for a 15 year loan.

Amortization Schedule monthly payment for a 15 year mortgage _____
(Note: if this is more than 2 or 3 cents different from your calculation, check your numbers!)

Total interest paid over 15 years_____

Total amount paid_____

Number of first payment when more of payment goes toward principal than interest _____

Suppose you paid an additional $100 towards the principal each month. How long would it take to pay off the loan with this additional payment and how will this affect the total amount of interest paid on the loan? [If you are making extra payments towards the principal, include it in the monthly payment and leave the number of payments box blank.]

Length of time to pay off loan with additional payments of $100 per month_____

Total interest paid over the life of the loan with additional $100 monthly payments_____

Total amount paid with additional $100 monthly payments_____

Compare this total amount paid to the total amount paid without extra monthly payments. How much more or less would you spend if you made the extra principal payments?

Part IV: Reflection

Did this project change the way you think about buying a home? Each group member should write one paragraph with AT LEAST FIVE SENTENCES stating what ideas changed and why. If this project did not change the way you think, write how this project gave further evidence to support your existing opinion about buying a home. Be specific.