Salt Lake Community College
Mathematics Department

Math 1050 Mortgage Project

Name Yeimi Chavez **Due date:** 4/18/19

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 $20,100 Mortgage Amount $180,900

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%.

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

Show work here

180900 = PMT (1-(1 + (.04975/12)^(-12*30) / (.04975/12)

180900 / (186.8129595...) = PMT (186.8129595...) / (186.8129595)

PMT = $ 968.35

Monthly Payment for a 30 year mortgage $968.35

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 $968.35
(Note: if this is more than 2 or 3 cents different from your calculation, check your numbers!)

Total interest paid over 30 years $167706

Total amount paid $348606

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?

Initially the couple hundred payments that you make toward paying off your loan are focused on paying off the interest of the loan verses the actual amount that you borrowed, your principle. In this scenario payment 194 is the first payment in where your money is actually going more towards your principle than interest. This decrease interest pattern will continue until you completely finish of paying your loan. The interest of your payments are almost as much as the original cost (principle).

Number of first payment when more of payment goes toward principal than interest 194

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? Show your work for making this calculation.

Show work here

$\frac{\$968.35}{x} \quad \frac{35}{100} \quad \text{------->} \quad 96835 = 35x$

96835 / (35) = 35x / (35)

$2,766.714286 = x

Minimum monthly take home pay = $2,766.71.

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? Show your work for making this calculation.

Show work here.

$$\frac{2,766.71}{x} \quad \frac{73}{100} \quad \text{------->} \quad 27,6671 = 73x$$

27,6671 / (73) = 73x / (73)

\$3790.013699 = x

\$3790.01 (12) = \$45480.16

Minimum gross annual salary = $45,480.16

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. Show your work.

Show work here.

A = 201,000 e^(.04*10)

= 201,000 e^(.4)

= \$299.856.7642

Value of home 10 years after purchase $299,856.76

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 $299,856.76

Original down payment $20,100

Mortgage paid over the ten years $116200.8(

The principal balance on your loan after ten years $147,036.48

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

The toal amount that is owed/payed for the house is $256,900.80. Therefore, there was a gain of $46,637.13 from selling it a the price of $299,856.76. You have gained $16,519.48 over the 10 years.

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%.

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

Show work here.

PMT = 180900 (.04735/12) / 1 - (1 + .04735/12) ^ (-12*15)

= 180900 (.0039458) / 1 - (1 + .0039458)^(-180)

PMT = $1405.6944

Monthly Payment for a 15 year mortgage = $1,405.6(

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 $1,405.70
(Note: if this is more than 2 or 3 cents different from your calculation, check your numbers!)

Total interest paid over 15 years 72124.20

Total amount paid 253024.2

Number of first payment when more of payment goes toward principal than interest 5th

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 13.6 yrs.

Total interest paid over the life of the loan with additional $100 monthly payments 64713.2

Total amount paid with additional $100 monthly payments 245613.2

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?

You would spend $7,410.91 less if you paid an extra $100 and also would get the loan paid off 1.4 years earlier, if you choose a 15 year mortgage.

Part III: Reflection

Did this project change the way you think about buying a home? Write one paragraph 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.

This project really painted the bigger picture in my reality of purchasing a home and showed the reality of interest costs when it comes to loans. I have never actually needed to take out a loan of any sort, but I'd like to think that I would like to purchase a home sometime in the future and getting a loan might be needed. I'm constantly hearing that based on the down payment that you put on your home purchase your payments will be determined, but I never actually hear the interest rate aspect of it. Its crazy to think that you are taking out a mortgage loan and that your payments at the beginning are more towards your actual interest rather than your principle. I'm sure that there are many individuals that might not even be aware how interest works in their payments and that a higher payment might be your lucky token to saving yourself that additional interest. I believe that the rule is to not spend more than 30% of your income on your rent/home payment but I do not think that people are actually aware of that when they apply for a loan. Overall, this project really was an eye opener for any financial situations that I might find myself in the near future.