

Your writeup of answers and discussion should be *typed*. When calculating quantities of money round off to the nearest cent. Answers should be supported by the calculation or processes used to find them. Your presentation (both justification of your work and your followup discussion) should be in complete sentences. You may work with your fellow students and use any resources you like, but the words you use to describe your work must be your own. **If your answers are either a duplication of or duplicated by another student's answers, you will receive no credit for this assignment.**

## 1 The Scenario

At long last, you are ready to buy a house! You've saved up a little money for the down payment, and you've got a steady job which you figure can pay the mortgage, and you've gone out and looked at houses until you've found one that fits your requirements, for a mere \$130,000. But now you've got to figure out what loans you can afford and how much owning the place where you sleep is *really* going to cost you.

## 2 The Present

Your research suggests that there are four different possible fixed-rate loans available to you, all of which have a monthly payment and monthly compounding:

- A 15-year mortgage at an annual rate of 2.525% with 1.5 points included in the loan.
- A 15-year mortgage at an annual rate of 3% with no points.
- A 30-year mortgage at an annual rate of 3.5% with 1 point included in the loan.
- A 30-year mortgage at an annual rate of 3.75% with no points.

In addition, there are two possibilities offered by the bank for providing a down payment:

- You can pay a 20% down payment before taking out the loan.
- You can pay a 5% down payment before taking out the loan, and purchase *private mortgage insurance*, which has a yearly premium equal to 0.5% of the initial loan principal. This yearly premium is divided by 12 and charged to you monthly.

Closing costs are \$1200 regardless of what loan you choose.

Even ignoring which of the eight possible combinations of loan product and down payment are best, you might not even be able to afford some of them. So you're going to need to know both the up-front costs of the mortgage and the recurring monthly costs.

For each of the eight possible ways to structure your loan, determine how much you will owe up front and how much you will need to pay each month total between the mortgage itself and the PMI premiums (if any).

You have \$25,000 in cash on hand and \$800 in monthly income which you can devote to paying for your house.

Which of the eight possible ways to design your loan is actually possible with the resources you have? Which of the loans available to you is best?

Your sister offers to lend you up to \$3000 now with no interest, provided you can pay her back within a year.

Will your sister's offer help you? What options could you take with this additional funding? If she does provide you this loan, how could you be certain of paying her back? Which loan would you take out under these circumstances?

### 3 The Future

You eventually choose to take out the 30-year mortgage with a 3.75% interest rate and no points and pay 20% down (note: this may or may not be the best answer in the previous parts). For five years, you make your payments as usual.

After these five years, what would be the remaining balance on the principal, and what would you expect to be your finance charge for the remaining 25 years in the lifetime of the loan?

#### 3.1 The Good Alternative Timeline: Prosperity and Overpayment

At this point (five years into the life of the loan), you get a raise and find yourself with more disposable income. You decide to commit an additional \$100 per month towards your mortgage, paying the extra towards the principal.

Your original loan had 25 more years to run until it was paid off. With this additional payment, how long will it take to pay the loan off?

What is the total finance charge you will pay on the loan with this overpayment? How much would you save over the amount your original loan would have cost you?

#### 3.2 The Bad Alternative Timeline: Scarcity and Refinancing

In a different timeline, at the same point five years into the loan, you find yourself saddled with unforeseen expenses and want to investigate refinancing your loan as both interest rates and your income have dropped. The bank offers you an interest rate of 3.375% on a 30-year fixed-rate refi, with no points but with \$1000 in closing costs, which they offer to roll into the loan principal.

What would your new monthly payment be?

What is the total finance charge you will pay on the refinanced loan? Over the lifetime of the loan, will this cost more or less than your original loan, and by how much?

What are the advantages and disadvantages of refinancing in this situation? How would you decide whether or not to refinance?