

Your writeup of answers and discussion should be *typed*. When calculating quantities of money round off to the nearest cent. Every question in a box should be answered fully in your write-up. Answers should be supported by the calculation, processes, or tools 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 \$150,000. 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 2.875% with 0.1 points included in the loan.
- A 15-year mortgage at an annual rate of 3.125% with no points.
- A 30-year mortgage at an annual rate of 3.5% with 1.1 points included in the loan.
- A 30-year mortgage at an annual rate of 3.875% 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 \$1800 regardless of what loan you choose. In determining which mortgage you want, you need to get a feel for just what the consequences of each choice would be.

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

Based on your computations above, explain how you would choose among the various loan configurations available, taking into account the fact that you might have any amount of cash on hand, and any future income. Of the eight possible setups, are there any which would *never* be worth using? For each loan setup which might be useful, in what life circumstances would that particular setup be your best option?

### 3 The Future

You eventually choose to take out the 30-year mortgage with a 3.875% interest rate and no points and pay 20% down (note: this may or may not be the best answer in the previous parts). You intend to make payments as usual for seven years, and then revisit your options.

After these seven years, what would be the remaining balance on the principal, and what would you expect to be your finance charge for the remaining 23 years in the lifetime of the loan?

One prospect you are considering is increasing your payment, to pay \$150 extra each month to reduce the principal on your loan.

Your original loan had 23 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?

Another prospect seven years into your loan is to refinance, as interest rates have dropped. The bank offers you an interest rate of 3.5% 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?

**Bonus question:** If you refinance *and* pay your original monthly payment instead of the new one, is your total outlay more or less than your original loan, and by how much?

What are the advantages and disadvantages of each of the above options? What life circumstances would dictate what decision you make among the several possibilities given (as well as the possibility to not change your loan at all)?