# Loans: car & student loans, credit card purchases, mortgages

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Math 107-03, Spring 2020, Spelman College

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# Overview

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*We did car loans, student loans, and credit card purchases earlier. We review those today and then do mortgages. Mortgages present no difficulties for those who have applying the formula.*

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**Page 250 of the textbook provides guidance as to how to use a calculator to implement this. Remember to round your final answer to the nearest penny.**

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This commits you to **Total Payments** of $36 \times \$188.02 = \$6768.72$. That's \$768.72 more than you borrowed: this total interest is extra money you paid back which the bank profits from.

# Car Loans (continued)

For the second loan conditions:

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Less pain per month, but dragged out over 5 years you are paying back more than 25% interest!

# Car Loans (How Much Car You Afford to Borrow?)

The other use of the Loan Formula is to find $P$ given $PMT$.

*You can afford monthly repayments of $300. How much can you borrow to buy a car if you want to pay back over 4 years at an interest rate of 6.2% compounded monthly? Find your total repayments and the interest paid back as a percentage of the loan.*

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By division, we find $PMT = \$12,724.35$. The interest is thus $\$14,400.00 - \$12,724.35 = \$1,675.65$. You can check that this is 13.17% of the amount borrowed.

# Student Loans

Student Loans work just like Car Loans, but the amount borrowed is much higher and the loan term is typically 10 or more years.

*You have a $30,000 loan, at 5.13%, to be paid off in 15 years. Find the monthly repayments, the total payments, and the interest paid.*

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*The federal student loan interest rate for undergraduates is 4.53% for 2019-20. Check that an $80,000 loan paid back over 12 years commits you to almost $104,000 in repayments.*

# Credit Cards

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Since we all tend to use credit cards quite frequently, the requested monthly payments on bills are very difficult to break down. But it IS smart to make those minimum payments, as otherwise additional charges or fines can be applied. Always read the "fine" print!

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**Page 255 of our text has tips on avoiding credit card trouble.**

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We only consider the basic mathematics of fixed rate mortgages.

# Mortgages

(Example 6 on page 257)

*A \$100,000 mortgage comes with choices: either 8% APR for 30 years or 7.5% APR for 15 years. In each case find the monthly payments, the total payments, and the interest paid. Discuss.*

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For the first conditions we have

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Hence total payments are $360 \times \$733.76 = \$264,153.60$. That's $164,153.60 more than the $100,000 you borrowed: dividing by $100,000 reveals you pay back 164% interest!

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What what's the catch?

# Smart mortgages options

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What would you do it you were only sure you could only afford $850 a month and you had to pick one of these mortgages?

The safest choice would be the 30-year one with the lower payments. But you will be in debt for most of your working life, and it will cost you (almost) an EXTRA $100,000 in interest.

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If you go for the 15-year one, with the higher payments, you take a risk. You might pay the required $927.01 per month for a few years but if you fall short for a few months in a row, then "your" house might be reposessed by the bank.

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Is there a third option? Yes!

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The bank has to sweat more to keep recalculating what you still owe, but that's their problem and they are legally obliged to do it and to get it right.

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The REALLY SMART thing to do is to sign the paperwork for the longterm low monthly payment mortgage, which is a very serious legally binding contract, but actually pay off more every month! ("As if you were legally committed to a mortgage with higher monthly payments.")

While the interest rates just discussed were not the same, if you tried to pay about $900 a month and you succeeded most of the time (thereby "overpaying") you would in effect reduce the debt to zero in less than 20 years.

The bank has to sweat more to keep recalculating what you still owe, but that's their problem and they are legally obliged to do it and to get it right.

This is an option most people don't know about.