Homework 2, CSCE 240, Fall 2016

Objectives

1. To gain expertise in C++ functions.
2. To gain expertise in C++ looping and control structure.
3. To gain expertise in C++ input and output, especially formatting.

Assignment

You are to create a program to amortize a loan based on a steady payment plan.

Your program will have a program file `main.cc` and will be compiled with a simple makefile.

Your program will take as input the loan amount and the interest rate as a yearly rate. These are `double` values.

The interest rate should be input as a percent, which then must be converted to a multiplier. That is, a rate of 4.29% would be input as 4.29 and would then have to be changed in your program to 0.0429 in order to be a yearly multiplier. (And this will then have to be divided by 12 to get a monthly multiplier.) This should be input as a number; do not use the percent sign. That only complicates the input of data.

Your program will first echo the input back to the user.

The goal of the program is to determine a ballpark number for the payment (in multiples of $25.00 per month) necessary to pay off the loan in less than 15 years (180 months).

To do this, your program will run what amounts to a double loop. The outer loop, in the main program, will start at $125.00 per month and increase by $25.00 per month until a payoff in less than 180 months is achieved.

In this outer loop in the main program you will call a function to determine the number of months at the given payment and interest rate needed to pay off the loan.

In the function, which is the inner loop, you will run a month-by-month loop until the principal value drops below zero, and you will return the number of months needed to make this happen.

Error Handling

If it should happen that the investment amount or the rate of return are negative, then your program should print an error message to that effect and not continue with the computation.

Example

A sample of successful execution is in the test directory. This starts with a loan of $28233, which is the average student debt for an undergraduate graduating from a public university. The interest rate is 4.29%, which is (according to one website) the current interest rate on student loans.

Note also the fencepost condition for starting things up. This is the only tricky thing about this program. Loans are paid in arrears. Thus, *at the end of month 1*, a loan of 28233 has accrued

$$28233 \cdot 4.29/(100.0 \cdot 12.0) = 91.34$$

in interest. If the payment per month is $125.00, then the payment on the principal at the end of month 1 is $24.07.