Program Development Process

Step 1: Requirements specification

Read the problem to be solved.

State the problem clearly / Understand the problem.

Describe the problem to be solved in your own words here:

The purpose of the program is to calculate the monthly payment on a home mortgage given the loan amount, rate, and years.

Step 2: Analyze

Describe the data flow and to identify the inputs, outputs, and constants. Identify what the output is first, and then figure out what input data you need. This list will eventually lead to the list of variables and constants to be defined.

Inputs Outputs Constants

Loan Amount Monthly Payment Interest Rate Total Payment

Number of years

Step 3: Program design

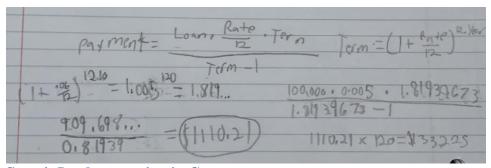
Describe the process for obtaining the output from the input.

Note the steps you are performing.

This will lead to the C++ statements you write.

Your algorithm design is described here.

Show your manual calculations (hand work) here.



Step 4: Implementation in C++

Also known as coding

Develop a C++ solution using your work from step 3.

Write the declarations first and then write the C++ statements.

Enter and debug program on the computer.

Show your source code here:

// Include Section

#include <iostream>

#include <cstdlib>

using namespace std;

```
class Mortgage
public:
     // Constructors
Mortgage(double l, double r, double y);
Mortgage();
     // Mutators
void setLoan(double 1);
void setRate(double r);
void setYear(double y);
     // Accessors
double getPayment();
double getLoan();
double getRate();
double getYear();
double getTerm();
double getTotal();
private:
     double loan;
                     // Dollar amount of the loan
     double rate; // Annual interest rate
     double year; // Number of years of the loan
};
// Main Program
Mortgage Input(Mortgage mort) //Reads inputs
double loan, rate, year;
cout << "Enter the loan amount($): ";
cin >> loan;
cout << "Enter the annual interest rate(%): ";</pre>
cin >> rate;
cout << "Enter the number of years: ";
cin >> year;
mort.setLoan(loan);
mort.setRate(rate);
mort.setYear(year);
return mort;
void Output(Mortgage mort) //Outputs solution
cout << "\nLoan: $" << mort.getLoan() << endl;</pre>
cout << "Rate: " << mort.getRate()*100 << "%" << endl; cout << "Years: " << mort.getYear() << endl;
cout << "Monthly Payment: $" << mort.getPayment() << endl;</pre>
cout << "Total Payment: $" << mort.getTotal() << endl;</pre>
int main()
// Variable Declarations
double loan = 0, rate = 0, year = 0;
Mortgage mort;
// Output Identification
system("CLS");
cout << "Assignment 5 Exercise #2 by Aidan Sullivan - "
<< "House Mortgage\n\n";
mort = Input(mort);
Output(mort);
cout << "\nEnd\ Program.\n";
return 0;
Mortgage::Mortgage(double l, double r, double y)
loan = 1;
rate = r;
year = y;
```

```
Mortgage::Mortgage()
loan = 0.0;
rate = 0.0;
year = 0.0;
void Mortgage::setLoan(double l)
if (1 >= 0)
loan = 1;
else
cout << "Invalid Loan\n";</pre>
exit(EXIT_FAILURE);
void Mortgage::setRate(double r)
if (r >= 0)
rate = r/100;
else
cout << "Invalid Rate\n";
exit(EXIT_FAILURE);
void Mortgage::setYear(double y)
if (y >= 0)
year = y;
else
cout << "Invalid Year\n";
exit(EXIT_FAILURE);
double Mortgage::getPayment()
return (loan * (rate/12) * getTerm())/(getTerm()-1); //Payment Equation
double Mortgage::getLoan()
return loan;
double Mortgage::getRate()
return rate;
double Mortgage::getYear()
return year;
double Mortgage::getTerm() //For getPayment
return pow((1+(rate/12)),12*year);
double Mortgage::getTotal()
return year*12*getPayment();
```

Step 5: Testing

Test your program with sample data set to make sure the output is correct.

Should test multiple data sets including the boundary cases. Summary and analyze your result. Show the output screen shots here.

Microsoft Visual Studio Debug Console

```
Assignment 5 Exercise #2 by Aidan Sullivan - House Mortgage
Enter the loan amount($): 240000
Enter the annual interest rate(%): 3.534
Enter the number of years: 30
Loan: $240000
Rate: 3.534%
Years: 30
Monthly Payment: $1082.27
Total Payment: $389616
End Program.
C:\CIS121\ASN5\Debug\ASN5.exe (process 18636) exited with code 0.
Press any key to close this window . . .
 Microsoft Visual Studio Debug Console
Assignment 5 Exercise #2 by Aidan Sullivan - House Mortgage
Enter the loan amount($): 100000
```

```
Enter the annual interest rate(%): 6
Enter the number of years: 10
Loan: $100000
Rate: 6%
Years: 10
Monthly Payment: $1110.21
Total Payment: $133225
End Program.
C:\CIS121\ASN5\Debug\ASN5.exe (process 17344) exited with code 0.
Press any key to close this window . . .
```