Application Challenge – Monthly Payment Class

Purpose: To develop and test Java a Java class utilizing instance variables and methods.

Problem: Your team lead has assigned you to develop a class that will be added to the firm's Java "loan" package. This class will calculate the monthly payment on a loan. You must include full API documentation for your class. You have also been assigned to unit test the class that you add to the package.

Project Requirements:

1. The class you develop shall be called "LoanMonthlyPayment".
2. The class shall be added to the "loan" package.
   - ***Loan Payment functions:*** The LoanMonthlyPayment class shall calculate the monthly payment required to pay off a loan given the amount purchased, down payment, interest rate (APR), and loan duration.

3. The detailed specification for this class and the methods required for this project are provided in Appendix A.

4. A full API must be provided for the class you develop. The API must be embedded in the software such that a documentation package can be generated using the Javadoc tool.

Design Goals:

Application software will be written to be easily maintained (i.e., easily understood and modified).

Task List:

1. Implement the Java module that meets the project requirements and design goals listed above. Use the NetBeans IDE to develop the code.
   All code submitted must be your group's original work.

2. Test your module using the test vectors provided in Appendix C. Write a test report using the test report template supplied on Blackboard. Your test report must include the following:
   - Test vectors showing test results for each test case (i.e., indication that your code either did or did not produce the expected results)
   - A screen shot of the test output for one of the test cases specified in the test vectors.
   - Include the test report in the "doc-files" folder of your project (in PDF format).

Grading

The grading policy for this project is as follows:

- Zero points will be awarded for Javadocs if the Javadoc tool cannot successfully run on your project.
- Your project will be evaluated using the instructor's test software. Therefore, strict adherence to the API specified in the assignment is mandatory, or your code will not run on the test platform. Zero points will be awarded for both performance and the test report if your code doesn't run on the instructor's test platform.

Assignment Grading Rubric	
Item	**Points**
Javadocs	
Class	2
Constructors	4
set and get methods	4
calcMonthlyPayment ()	2
Performance	
Constructors	6
set and get methods	4
calcMonthlyPayment ()	18
Test Report	
Screen Shot	2
Test Cases	8
Assignment Total	**50**

Appendix A – LoanMonthlyPayment Class Detailed Specification

The LoanMonthlyPayment class calculates the monthly payment needed to pay off a loan. The class API is based on a purchase amount and a down payment. Internally, the class calculates the amount to be financed by the loan as the purchase amount less the down payment.

Exhibit A-1. LoanMonthlyPayment Class Diagram

LoanMonthlyPayment
+ LoanMonthlyPayment () + LoanMonthlyPayment (double: purchaseAmount, double: douwnPayment, double: apr, double: years) + setPurchaseAmount (double) + setDownPayment (double) + setAPR (double) + setYears (double) + getPurchaseAmount (): double + getDownPayment (): double + getAPR (): double + getYears (): double + calcMonthlyPayment (): double

Constructor Requirements

The class constructor creates a LoanMonthlyPayment object configured to calculate a loan payment. Two constructors are required, one that does not accept parameters, and one that does. Where no parameters are used, the "set" methods must be used to store loan parameters within the resulting object. Where parameters are used, the loan parameters are provided to the object through the constructor.

Constructor declaration and parameter definitions shall be as follows:

```
public LoanMonthlyPayment (double purchaseAmount,
                           double downPayment,
                           double apr,
                           double years)
```

purchaseAmount - the amount of the purchase to be made by the borrower
downPayment – the down payment to be made by the borrower against the purchase amount
apr – the annual percentage rate (APR) to be applied to the loan.
years - the duration of the loan in years

Method Requirements: set and get methods

A "set" and "get" method must be provided to change and access each of the loan parameters.

```
public double calcMonthlyPayment ()
```

return – the value of the loan monthly payment.

Appendix C – Class Test Vectors

Exhibit C-1. LoanMonthlyPayment Class Test Vector

Test Case	Purchase Amount	Down Payment	APR (%)	Duration (years)	Monthly Payment
1	350000	0	10	15	3761.12
2	350000	50000	10	15	3223.82
3	350000	0	5	15	2767.78
4	350000	50000	5	15	2372.38