

Name: _____

Date: _____

Assignment 1 (10%), Issued on T3W6, Due: 23 August (T3W9)

Topics covered: Chapter 1 to 4 (Object & Classes, variable data types, Flow Control and String)

Before working on assignment, download assignment1.zip from espace. Refer to Appendix 4 on the explanation of files provided.

Problem Statement

Create an application that will allow user to apply for loan and perform check on personal information.

Appendix 1 provides background information on how to calculate monthly payment based on given loan amount, interest rate and payment periods.

Tasks

Create the following two classes:

1. **Customer** Class

- a. Create a class **Customer** which has the following private attributes
 - name
 - salary
 - loanAmt.
- b. Create constructors (Take a close look at LoanMenu class)
- c. Create assessor methods to gain access to these attributes.
- d. Create a mutator method to set loan amount.
- e. Provide a method **info** to print out name, salary and loanAmt

2. **Loan** Class

Loan class is a utility class. All the methods in the class are static. You need to have the following static methods:

- a. static double computeBalance(double d, double i, double n, double m)
Computes the balance b(m) at m months for a simple interest loan of amount d at annual interest I with a term of n months.
- b. static double monthlyPayment(double d, double i, double n)
Computes the monthly payment p for a loan amount d at annual interest I with a term of n months
- c. static boolean applyLoan(double d, double i, double t, double sal)
Loan will be approved if the debt ratio is <20%. The codes for applyLoan method are provided for you in appendix 2.
- d. static void print(double d, double i, double n, double m)

e. `static void print(double d, double i, double n)`

Method (c) and (d) are overloading methods. Method (d) will print the amortization table based on the specified term m (as in appendix 3). Method (e) will print out all the information for all the terms n (the table in appendix 1).

What to submit:

1. Customer.java
2. Loan.java
3. Two Test cases
 - Loan amount of \$100000, print out all the payment periods
 - Loan amount of \$50000, print out 15 payment periods.
4. Give at least two suggestions on how we can further improve the implementation.

Note:

- Do not copy from each other. If you are able to do this yourself, you have understood OOP concepts.
- Do not modify LoanMenu.java.

Appendix 1

Background Information:

Suppose you want to borrow an amount d to purchase a house. Bank offers a loan with n monthly payments at an annual interest rate of $i\%$. The formula to determine your monthly payment p is:

$$p = d(a-1)a^n / (a^n - 1), \text{ where } a = 1 + \left(\frac{i}{12 * 100} \right)$$

Suppose the loan is a simple interest loan, then the interest charge each month is based on the existing current balance. Your balance $b(m)$ after the month m is

$$b(m) = da^m - \frac{p(a^m - 1)}{a - 1}$$

Below is a printout based on loan amount of \$10,000, interest at 7% for 36 months.

Month	Opening Balance	Payment	Debt Paid	InterestPaid	Closing Balance
1	10000.00	308.77	250.44	58.33	9749.56
2	9749.56	308.77	251.90	56.87	9497.66
3	9497.66	308.77	253.37	55.40	9244.30
4	9244.30	308.77	254.85	53.93	8989.45
5	8989.45	308.77	256.33	52.44	8733.12
6	8733.12	308.77	257.83	50.94	8475.29
7	8475.29	308.77	259.33	49.44	8215.96
8	8215.96	308.77	260.84	47.93	7955.11
9	7955.11	308.77	262.37	46.40	7692.75
10	7692.75	308.77	263.90	44.87	7428.85
11	7428.85	308.77	265.44	43.33	7163.41
12	7163.41	308.77	266.98	41.79	6896.43
13	6896.43	308.77	268.54	40.23	6627.89
14	6627.89	308.77	270.11	38.66	6357.78
15	6357.78	308.77	271.68	37.09	6086.10
16	6086.10	308.77	273.27	35.50	5812.83
17	5812.83	308.77	274.86	33.91	5537.96
18	5537.96	308.77	276.47	32.30	5261.50
19	5261.50	308.77	278.08	30.69	4983.42
20	4983.42	308.77	279.70	29.07	4703.72
21	4703.72	308.77	281.33	27.44	4422.39
22	4422.39	308.77	282.97	25.80	4139.41
23	4139.41	308.77	284.62	24.15	3854.79
24	3854.79	308.77	286.28	22.49	3568.50
25	3568.50	308.77	287.95	20.82	3280.55
26	3280.55	308.77	289.63	19.14	2990.91
27	2990.91	308.77	291.32	17.45	2699.59
28	2699.59	308.77	293.02	15.75	2406.57
29	2406.57	308.77	294.73	14.04	2111.83
30	2111.83	308.77	296.45	12.32	1815.38
31	1815.38	308.77	298.18	10.59	1517.20

32	1517.20	308.77	299.92	8.85	1217.28
33	1217.28	308.77	301.67	7.10	915.61
34	915.61	308.77	303.43	5.34	612.18
35	612.18	308.77	305.20	3.57	306.98
36	306.98	308.77	306.98	1.79	0.00

Appendix 2

```
static boolean applyLoan(double d, double i, double t,double sal)
{
    boolean approved = false;
    double debtRatio = (monthlyPayment(d,i,t)/sal)*100;
    if(debtRatio<20)
    {
        approved=true;
    }
    return approved;
}
```

Appendix 3

Your loan is approved

Enter: 0(Print all)

Num of months to print:

>10

Month	Opening Balance	Payment	Debt Paid	InterestPaid	Closing Balance
1	10000.00	308.77	250.44	58.33	9749.56
2	9749.56	308.77	251.90	56.87	9497.66
3	9497.66	308.77	253.37	55.40	9244.30
4	9244.30	308.77	254.85	53.93	8989.45
5	8989.45	308.77	256.33	52.44	8733.12
6	8733.12	308.77	257.83	50.94	8475.29
7	8475.29	308.77	259.33	49.44	8215.96
8	8215.96	308.77	260.84	47.93	7955.11
9	7955.11	308.77	262.37	46.40	7692.75
10	7692.75	308.77	263.90	44.87	7428.85

Appendix 4

These are the following files in Assignment1.zip:

- LoanMenu.java
- LoanMenu.class
- Loan.class
- Customer.class

To run the sample application, type the following at command line:

```
> java -jar assignment1.jar
```

Output:	Notes
Welcome to NUSHS Banking System Enter customer name: john	Type any customer name Enter john
Enter your monthly salary:\$	For new customer only Enter 5000
Enter: 1:Apply House Loan 2:Check Customer Information 3:Check Loan 4:Exit >	A loan menu will appear. Enter 2
Customer name>john Salary>5000.00 Current Loan Amt> 0.00	Customer information will appear. Enter 1 at the loan menu
Enter loan amt: Enter term: Your loan is approved Enter: 0(Print all) Num of months to print: >	Prompt for loan amount Enter 10000 Prompt for term (number of payment periods) Enter 36 Loan payment will be approved based on debt ratio indicated in appendix 2. Prompt for number of months to print. Enter 0 (to print all) Or Enter 10 (to print only the first 10 months) Output will be either Appendix 1 or Appendix 3. Enter 3 to check loan
Current Loan Amt>10000.00	The loan amount is shown. Enter 4 to exit

Welcome to NUSHS Banking System Enter customer name:john Customer name>john Salary>5000.00 Current Loan Amt>10000.00	Run the program again. Enter john Enter 2 (Check Customer Information) John's salary and loan amount are remembered!
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Explanation of key methods

Methods	Explanation
public static double readFromFile(String filename)	Read a value that is stored in a text file based on given filename. Return value (if successful) or -99999
public static void createFile(String filename,double value)	Print a value to a text file
public static void mainMenu(String name, double salary,double loanAmt)	Main menu for loan application