Lesson – 2- Home Work Assignment

Problem 1: EMI Quote Calculator

A local bank wants a console-based **"Quick EMI Quote Calculator"**. Each time a visitor taps "Try a sample quote," the kiosk should **simulate** a loan offer and show a clean summary.

You should do the following:

Create a class **`QuickEmiQuote`** with a `main` method that:

1. **Randomize inputs(Use Random/ RandomGenerator API)**
   - Principal **P**: random integer in **[5,000 .. 25,000]** dollars
   - Tenure **n**: random integer months in **[6 .. 36]**
   - Annual interest rate **APR%**: random one-decimal value in **[3.5 .. 11.5]** (e.g., 7.2%)

2. **Compute EMI (Equated Monthly Installment – Use Math API)**
   - Monthly rate `r = APR / 12 / 100`
   - EMI formula (use `Math.pow`):

$$\text{EMI} = \frac{P \cdot r \cdot (1+r)^n}{(1+r)^n - 1}$$

   - **total payment =** (`EMI * n`)
   - **total interest** =(`total payment - P`).

3. **Show multiple integer views** of the EMI
   - **Cast to int**: truncate cents from Calculated EMI price (e.g., `$312`)
   - **Rounded EMI to the nearest int** using `Math.round` (e.g., `$313`)

4. **Format the output nicely all the 1 to 3 steps of computations and the inputs**
   - Use `System.out.printf` to show money with **two decimals**.
   - Present a neat summary block.

Problem – 2 – Extract Product Code

The records of a database table Product have been stored in text format as s String in your given program using delimiters ":" and "," in the following way: Different rows are separated by ":" and, within a particular record, different column entries are separated by ",". In each record, the first column is always productId.

Write a program (called Prog3) that will read from the string records and extract all the product id's that occur in the String. Here, records work as text file. Your program should then output ALL the product id to the console in the following form: (this is a typical example)

```
231A

113D

521W

009G
```

```
public class Prog2 {

            public static void main(String[] args){

 //column names: productId, name, numInStock, provider, pricePerUnit

String records = "231A,Light Bulb,123,Wilco,1.75:"+
                 "113D,Hairbrush,19,Aamco,3.75:" +
                  "521W,Shampoo,24,Acme,6.95:" +
                   "440Q,Dishwashing Detergent,20,Wilco,1.75:" +
                  "009G,Toothbrush,77,Wilco,0.85:" +
                   "336C,Comb,34,Wilco,0.99:" +
                 "523E,Paper Pad Set,109,Congdon and Chrome,2.45:" +
                 "888A,Fake Diamond Ring,111,AmericusDiamond,3.95:" +
                 "176A,Romance Nove1 1,20,Barnes and Noble,3.50:" +
                   "176B,Romance Nove1 2,20,Barnes and Noble,3.50:" +
                 "176C,Romance Nove1 3,20,Barnes and Noble,3.50:" +
                 "500D,Floss,44,Wilco,1.25:" +
                 "135B,Ant Farm,5,Wilco,8.00:" +
                 "211Q,Bicycle,9,Schwinn,75.95:" +
                 "932V,Pen Set,50,Congdon and Chrome,9.95:" +
                 "678Q,Pencil 50,123,Congdon and Chrome,9.95:" +
                 "239A,Colored Pencils,25,Congdon and Chrome,4.75:" +
                 "975B,Shower Curtain,25,Wilco,6.50:" +
                 "870K,Dog Bowl,15,Wilco,4.75:" +
                 "231S,Cat Bowl,15,Wilco,4.75:" +
                 "562M,Kitty Litter,15,Wilco,3.25:" +
                 "777X,Dog Bone,15,Wilco,4.15:" +
                 "933W,Cat Toy,15,Wilco,2.35:" +
                 "215A,Hair Ball,0,Little Jimmy,0.00:";

 // Implement the code

 }

}
```

Problem – 3 – Remove Array Duplicates

Write a program called Prog4. Create an array that accepts only an array of Strings. Creates a new array in which all duplicate Strings in the original input array have been removed. **You should not use any APIs like HashSet, TreeSet, etc.,** Write your own logic. Also, your result should not contain null values.

For example, if the input array is ["horse", "dog", "cat", "horse", dog"]

then the output would be the following array:

["horse", "dog", "cat"]

Problem – 4 – Practice loops

a) Write a Java program to calculate the first **N** terms of the series:

1 – 1/3 + 1/5 – 1/7 + 1/9 - …..

b) Write a Java program to calculate the first **N** terms of the series:

1/2 - 2/4 + 3/8 – 4/16 + 5/32 - …..

Example If n = 5 for the problem a,

a) 1 – 1/3 + 1/5 – 1/7 + 1/9

- Term 1: 1/1 = 1
- Term 2: -1/3
- Term 3: 1/5
- Term 4: -1/7
- Term 5: 1/9

Output: Sum = 0.832

The same way solve for the problem b.

Problem-5 – Finding Second Minimum

Create a Java method to find the second minimum value. Write your own logic without API usage.

```
public static void secondMin(int[] arrayOfInts)
```

(in a class Prog6) that outputs the second minimum of an array of `ints`.

Example: The method prints the result of second minimum 1 for the given array of int inputs.

```
[2, 21, 3, 45, 0, 12, 18, 6, 3, 1, 0, 22]
```

NOTE: **You may not use the sorting tools available in the Java libraries; for instance, you may not call Arrays.sort() to sort the input array. (No credit if you do it this way.)**

Problem 6: **Electricity Bill Generator**

The Electricity Board wants a simple console program that allows operators to generate bills for multiple customers.

Requirements

1. Ask the user for:
    - **User type** (R = Residential, C = Commercial, I = Industrial).
    - **Units consumed** (integer).
2. Use a **single switch expression** to compute the bill.
    - Residential: `$0.12` per unit
    - Commercial: `$0.20` per unit
    - Industrial: `$0.35` per unit
    - Invalid code → `$0.00`
3. Display the **bill details** neatly formatted.
4. After each bill, ask:

Do you want to calculate another bill? (y/n):

If user enters `y` or `Y`, continue.

If `n` or `N`, exit the program.

5. Use a **do–while loop** to control repetition.

Sample Output

```
Enter user type (R/C/I): R

Enter units consumed: 250

=== Electricity Bill ===

User Type: R

Units: 250

Bill Amount: $30.00

Do you want to calculate another bill? (y/n): y

Enter user type (R/C/I): C

Enter units consumed: 100

=== Electricity Bill ===

User Type: C

Units: 100
```

```
Bill Amount: $20.00
Do you want to calculate another bill? (y/n): n
Goodbye! Thanks for using the Electricity Bill Generator.
```

Interview Practice

Try individually the Interview problems from leetcode.com, Neet code, or Hacker Rank at least two problems from the concepts of Arrays and Strings using loops. You can talk about your logic during the interview discussion session in the afternoon class. Not necessary to submit.

Lesson-1-Interview Reading Questions

1. Explain the execution flow of a Java Program.
2. What are source code and byte code files in Java?
3. Why is Java termed as a platform-neutral or independent language?
4. What is the role of JRE?
5. What are the components of JRE and its functionalities?
6. What is the importance of JIT?
7. What is the difference between JVM, JRE, and JDK?