JAVA Language Programming (CSE3040-01 / AIE3052-01)
Homework 1 (Fall 2023)

Due : October 4th, Tuesday 11:59 PM

Late Policy

- Deadline date for this assignment is October 4th 11:59 PM. If you lately submit until October 6th 11:59 PM, 10% of the score will be deducted for each day.
- Make sure that if you submit after October 6th, even though you submit it, you will get zero score.

Submission

- One java program (.java) for each problem.
- Each name is including the problem number. (problem1.java, problem2.java, etc)
- You should make .zip file for submission. (In .zip file, there will be problem1.java, problem2.java, etc)
- The name of .zip file is your “StudentID_name.zip” (ex. 120230249_Emily.zip)

1. Problem 1 (20 points)

   Write a Java program that sums up the sequence that is defined by given recurrence

   $$a_0 = 1,\ a_n = 2a_{n-1} + 1,\ (n = 1, 2, 3, \ldots.)$$

   The variables you can use inside the main method will be restricted as follows

   1) int a // you have to store the term of given sequence to this variable
   2) int sum // you have to store the result of summation to this variable
   3) int i // this variable is for the index inside the loop

   Specifically, the operators that can be used with the variable 'a' are restricted to bitwise operators and assignment operators. That means, you cannot use any arithmetic operators(‘+’, ‘-’, ‘*’, ‘/’ …) with variable ‘a’

   It is mandatory to use a loop inside the main method. Otherwise, you will get half of the full points.

   expected output

```
a0=1
a1=3
a2=7
a3=15
a4=31
a5=63
a6=127
a7=255
a8=511
a9=1023
Sum : 2036
```

2. Problem 2 (20 points)

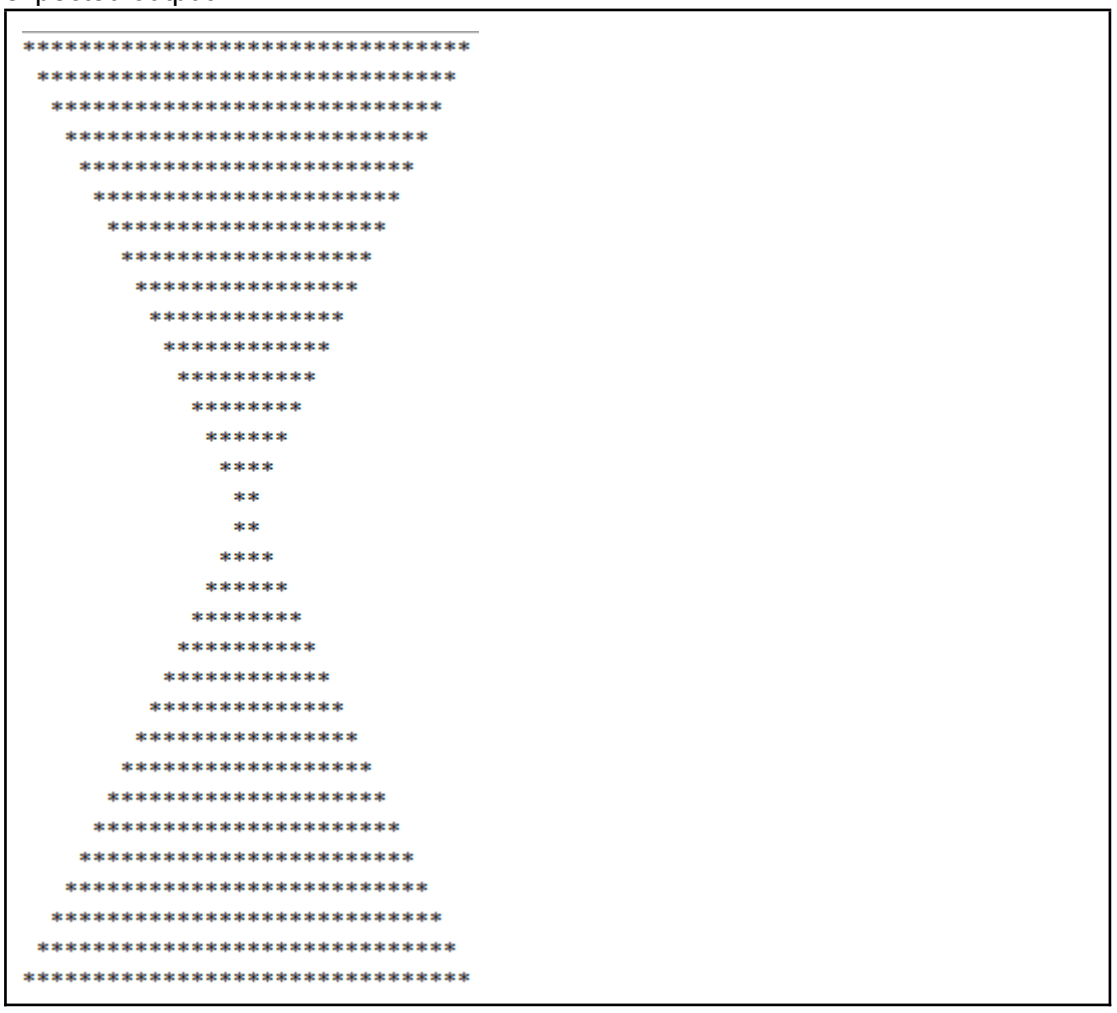
   Write a Java program that draws the Hourglass-like (모래시계) shape only using two permitted characters - '*', ' ' (asterisk, blank)

   You don't need to draw the shape exactly as the expected output below, that means you don't have to count down the exact number of asterisks in the example below.

   Full score will be given for the program that draws a symmetric Hourglass-like shape. (If the output is asymmetric to the center of the draw, there will be some point deduction.)

   It is mandatory to use a loop to draw the desired shape. If you don't use any loop to draw you will get 0 points.

   expected output



3. Problem 3 (20 points)

Given a test string s = "XXXXOXXXX", perform the following steps within a multiple-loop structure :

1. Generate random numbers within the range from 0 to the length of the string.

2. Check if the character at the corresponding position(generated random number) in the string s is 'O'.

3. If the character is 'O', print "hit" along with the generated random number and exit the loop.

4. If the character is 'X', print "miss" along with the generated random number and continue to the next iteration of the loop.

Please note that the provided test string may vary when scoring.

Expected output
(Notice it's just an example output. Depending on the random number, the answer would be various.)

```
random number is 4, miss

random number is 2, miss

random number is 0, miss

random number is 1, miss

random number is 0, miss

random number is 8, miss

random number is 2, miss

random number is 5, hit
```

4. Problem 4 (20 points)

Given a test string s = "JAVAjava", perform the following steps.

1. Print the length of the string.

2. Print the first character of the string (printing as a string type is also acceptable).

3. Print the last character of the string (printing as a string type is also acceptable)

Please note that the provided test string may vary when scoring.

expected output

```
the length of string is : 8
the first letter is J
the last letter is a
```

5. Problem 5 (20 points)
Complete the bank deposit and withdrawal program in Java.
First, you should create a personal account number.
And then, you can use the deposit and withdrawal system from the account. Also,
You can check the balance.
However, withdrawal is not possible if the balance is insufficient.

The functions are as follows.

1: Deposit money
2: Withdrawal
3: Check balance
4: Exit Program

Your account number is between 1 and 100000000000 as integer.

** For solve this problem, you have to use Scanner.
This is how to use Scanner class.

First, you have to import Scanner library in the top of your code.
import java.util.Scanner;

Second, you can use Scanner after making object like this.
Scanner scanner = new Scanner(System.in);

Third, if you have to get ‘integer’ as input, you can use scanner like this.
int i = scanner.nextInt();
When you use this code, you can get input integer into variable i.

To sum up these sequences, it is as follows.

```
import java.util.Scanner;

public class myScanner
{
   public static void main(String[] args)
   {
```

```
        Scanner scanner = new Scanner(System.in);

        int i = scanner.nextInt();

        System.out.println("int : " + i);
    }
}
```

If you have any confusion or having problem with using Scanner, use google or can email to TA.

Expected output

```
Create your account number : 45533345393

------------------------------------------------------------
1. Deposit | 2. Withdrawal | 3. Balance | 4. Exit
------------------------------------------------------------
Input : 1
Deposit money : 10000
------------------------------------------------------------
1. Deposit | 2. Withdrawal | 3. Balance | 4. Exit
------------------------------------------------------------
Input : 2
Withdrawal money : 3500
------------------------------------------------------------
1. Deposit | 2. Withdrawal | 3. Balance | 4. Exit
------------------------------------------------------------
Input : 3
Balance : 6500
------------------------------------------------------------
1. Deposit | 2. Withdrawal | 3. Balance | 4. Exit
------------------------------------------------------------
Input : 2
Withdrawal money : 10000
!! Insufficient Balance !!
Shortage amount : 3500
------------------------------------------------------------
1. Deposit | 2. Withdrawal | 3. Balance | 4. Exit
------------------------------------------------------------
Input : 3
Balance : 6500
------------------------------------------------------------
1. Deposit | 2. Withdrawal | 3. Balance | 4. Exit
------------------------------------------------------------
```

Input : 4

Exit Program