**C-DAC Mumbai Date 25/09/2024**

**Subject: Algorithm and Data Structure**

**Assignment 1**

**Solve the assignment with following thing to be added in each question.**

-Program

-Flow chart

-Explanation

-Output

-Time and Space complexity

1. Armstrong Number

Problem: Write a Java program to check if a given number is an Armstrong number.

Ans: public class Main

{

public static void main(String[] args) {

int n=153;

int c=n;

int arm=0;

while(n>0){

int rem=n%10;

arm=(rem\* rem\*rem)+arm;

n=n/10;

}

if(c = = arm){

System.out.println("ArmStrong no.");

}else{

System.out.println(" not ArmStrong no.");

}

}

}

Test Cases:

Input: 153

Output: true

Input: 123

Output: false

2. Prime Number

Problem: Write a Java program to check if a given number is prime.

Test Cases:

Input: 29

Output: true

Input: 15

Output: false

Ans: public class Main

{

public static void main(String[] args) {

int n=23; boolean flag=false;

for(int i=2;i<n;i++){

if(i%n==0){

flag=true;

}

else{

flag=false;

}

}

System.out.println(flag); //false;

}

}

3. Factorial

Problem: Write a Java program to compute the factorial of a given number.

Test Cases:

Input: 5

Output: 120

Input: 0

Output: 1

Ans: public class Main

{

static int fact(int n) {

if(n==1 || n==0)

return 1;

else {

return n \* fact(n-1);

}

}

public static void main(String[] args) {

System.out.println(fact(5));

}

}

4. Fibonacci Series

Problem: Write a Java program to print the first n numbers in the Fibonacci series.

Test Cases:

Input: n = 5

Output: [0, 1, 1, 2, 3]

Input: n = 8

Output: [0, 1, 1, 2, 3, 5, 8, 13]

Ans:

5. Find GCD

Problem: Write a Java program to find the Greatest Common Divisor (GCD) of two numbers.

Test Cases:

Input: a = 54, b = 24

Output: 6

Input: a = 17, b = 13

Output: 1

6. Find Square Root

Problem: Write a Java program to find the square root of a given number (using integer approximation).

Test Cases:

Input: x = 16

Output: 4

Input: x = 27

Output: 5

Ans: import java.lang.Math;

public class Main

{

static int squr(int n){

if(n==0){

return 0;

}

else{

return (int) (Math.round(Math.sqrt(n)));

}

}

public static void main(String[] args) {

System.out.println(squr(27));

}

}

7. Find Repeated Characters in a String

Problem: Write a Java program to find all repeated characters in a string.

Test Cases:

Input: "programming"

Output: ['r', 'g', 'm']

Input: "hello"

Output: ['l']

8. First Non-Repeated Character

Problem: Write a Java program to find the first non-repeated character in a string.

Test Cases:

Input: "stress"

Output: 't'

Input: "aabbcc"

Output: null

9. Integer Palindrome

Problem: Write a Java program to check if a given integer is a palindrome.

Test Cases:

Input: 121

Output: true

Input: -121

Output: false

Ans: class HelloWorld {

static int rev(int n, int temp) {

if( n == 0) {

return temp;

}

temp = (temp\*10) + (n%10);

return rev(n/10,temp);

}

public static void main(String[] args) {

int n=125;

int temp=rev(n,0);

if(n == temp) {

System.out.println("True");

}

else{

System.out.println("False");

}

}

}

10. Leap Year

Problem: Write a Java program to check if a given year is a leap year.

Test Cases:

Input: 2020

Output: true

Input: 1900

Output: false