

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.

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

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

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]

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

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

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