**Assignment 5**

**SET A**

Create a package named Series having three different classes to print series:

1. Fibonacci series
2. Cube of numbers
3. Square of numbers

Write a java program to generate 'n' terms of the above series.

1. // File: Series/Fibonacci.java

package Series;

public class Fibonacci {

public void printFibonacci(int n) {

int a = 0, b = 1;

System.out.print(a + " " + b + " ");

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

int next = a + b;

System.out.print(next + " ");

a = b;

b = next;

}

System.out.println();

}

}

ii Cube of Numbers

// File: Series/Cube.java

package Series;

public class Cube {

public void printCubes(int n) {

for (int i = 1; i <= n; i++) {

System.out.print((i \* i \* i) + " ");

}

System.out.println();

}

}

iii Square of numbers

// File: Series/Square.java

package Series;

public class Square {

public void printSquares(int n) {

for (int i = 1; i <= n; i++) {

System.out.print((i \* i) + " ");

}

System.out.println();

}

}

**// File: Main.java**

import Series.\*;

import java.util.Scanner;

public class Main {

public static void main(String[] args) {

Scanner sc = new Scanner(System.in);

System.out.print("Enter the number of terms (n): ");

int n = sc.nextInt();

Fibonacci fibonacci = new Fibonacci();

Cube cube = new Cube();

Square square = new Square();

System.out.println("Fibonacci Series:");

fibonacci.printFibonacci(n);

System.out.println("Cube of Numbers:");

cube.printCubes(n);

System.out.println("Square of Numbers:");

square.printSquares(n);

}

}

**2) Create a package named "utility". Define a class CapitalString under "utility" package which will contain a method to return String with first letter capital. Create a Person class (members - name, city) outside the package. Display the person name with first letter as capital by making use of CapitalString.**

**// File: utility/CapitalString.java**

package utility;

public class CapitalString {

// Method to capitalize the first letter of a given string

public String capitalizeFirstLetter(String str) {

if (str == null || str.isEmpty()) {

return str;

}

return str.substring(0, 1).toUpperCase() + str.substring(1).toLowerCase();

}

}

**// File: Person.java**

import utility.CapitalString;

public class Person {

String name;

String city;

Person (String name, String city) {

this.name = name;

this.city = city;

}

public void displayPersonInfo() {

CapitalString capitalizer = new CapitalString();

String capitalizedName = capitalizer.capitalizeFirstLetter(this.name);

String capitalizedCity = capitalizer.capitalizeFirstLetter(this.city);

System.out.println("Person Name: " + capitalizedName);

System.out.println("City: " + capitalizedCity);

}

public static void main (String [] args) {

Person person = new Person ("john", "london");

person.displayPersonInfo();

}

}

**3) Create a package named Number having three different classes :**

**i. Prime - Display the number is prime or not**

**ii. Palindrome - Display the number is Palindrome or not**

**iii. Armstrong - Display the number is Armstrong or not**

// Number/Prime.java

package Number;

public class Prime {

public void isPrime(int num) {

boolean isPrime = true;

if (num <= 1) {

isPrime = false;

} else {

for (int i = 2; i <= num / 2; i++) {

if (num % i == 0) {

isPrime = false;

break;

}

}

}

System.out.println(num + (isPrime ? " is a prime number." : " is not a prime number."));

}

}

**// Number/Palindrome.java**

package Number;

public class Palindrome {

public void isPalindrome(int num) {

int originalNum = num;

int reversedNum = 0;

while (num > 0) {

int digit = num % 10;

reversedNum = reversedNum \* 10 + digit;

num /= 10;

}

**// Number/Armstrong.java**

package Number;

public class Armstrong {

public void isArmstrong(int num) {

int originalNum = num;

int result = 0;

while (num > 0) {

int digit = num % 10;

result += digit \* digit \* digit;

num /= 10;

}

System.out.println(originalNum + (result == originalNum ? " is an Armstrong number." : " is not an Armstrong number."));

}

}

System.out.println(originalNum + (originalNum == reversedNum ? " is a palindrome." : " is not a palindrome."));

}

}

**// Main.java**

import Number.Prime;

import Number.Palindrome;

import Number.Armstrong;

public class Main {

public static void main(String[] args) {

int num = 153;

Prime prime = new Prime();

prime.isPrime(num);

Palindrome palindrome = new Palindrome();

palindrome.isPalindrome(num);

Armstrong armstrong = new Armstrong();

armstrong.isArmstrong(num);

}

}

**Output: 153 is not a prime number.**

**153 is not a palindrome.**

**153 is an Armstrong number.**

**SET B**

**1) Create a package named Demo having two different classes to perform operations on an array**

**i.** Sum of an array elements

**ii.** average value of array elements

**// Demo/Sum.java**

package Demo;

public class Sum {

public int calculateSum(int[] array) {

int sum = 0;

for (int num : array) {

sum += num;

}

return sum;

}

}

**// Demo/Average.java**

package Demo;

public class Average {

public double calculateAverage(int[] array) {

int sum = 0;

for (int num : array) {

sum += num;

}

return (double) sum / array.length;

}

}

**// Main.java**

import Demo.Sum;

import Demo.Average;

public class Main {

public static void main(String[] args) {

int[] array = {1, 2, 3, 4, 5};

Sum sumCalculator = new Sum();

System.out.println("Sum of array elements: " + sumCalculator.calculateSum(array));

Average averageCalculator = new Average();

System.out.println("Average of array elements: " + averageCalculator.calculateAverage(array));

}

}

**Output: Sum of array elements: 15**

**Average of array elements: 3.0**

**2. Create a package named operation having three different classes to perform following operations:**

**i.** Find Even No

**ii.** Find Odd No

**// operation/Even.java**

package operation;

public class Even {

public void findEvenNumbers(int[] array) {

System.out.print("Even numbers: ");

for (int num : array) {

if (num % 2 == 0) {

System.out.print(num + " ");

}

}

System.out.println();

}

}

**// operation/Odd.java**

package operation;

public class Odd {

public void findOddNumbers(int[] array) {

System.out.print("Odd numbers: ");

for (int num : array) {

if (num % 2 != 0) {

System.out.print(num + " ");

}

}

System.out.println();

}

}

**// Main.java**

import operation.Even;

import operation.Odd;

public class Main {

public static void main(String[] args) {

int[] array = {1, 2, 3, 4, 5, 6};

Even evenFinder = new Even();

evenFinder.findEvenNumbers(array);

Odd oddFinder = new Odd();

oddFinder.findOddNumbers(array);

}

}

**Output: Even numbers: 2 4 6**

**Odd numbers: 1 3 5**

**SET C**

**1)** Create a package named Area having four different classes to calculate area

**i.** Circle

**ii.** Rectangle

**iii.** Triangle

**iv.** Square

**// Area/Circle.java**

package Area;

public class Circle {

public double calculateArea(double radius) {

return Math.PI \* radius \* radius;

}

}

**// Area/Rectangle.java**

package Area;

public class Rectangle {

public double calculateArea(double length, double width) {

return length \* width;

}

}

**// Area/Triangle.java**

package Area;

public class Triangle {

public double calculateArea(double base, double height) {

return 0.5 \* base \* height;

}

}

**// Area/Square.java**

package Area;

public class Square {

public double calculateArea(double side) {

return side \* side;

}

}

**// Main.java**

import Area.Circle;

import Area.Rectangle;

import Area.Triangle;

import Area.Square;

public class Main {

public static void main(String[] args) {

Circle circle = new Circle();

System.out.println("Area of Circle: " + circle.calculateArea(5));

Rectangle rectangle = new Rectangle();

System.out.println("Area of Rectangle: " + rectangle.calculateArea(4, 6));

Triangle triangle = new Triangle();

System.out.println("Area of Triangle: " + triangle.calculateArea(5, 10));

Square square = new Square();

System.out.println("Area of Square: " + square.calculateArea(4));

}

}

**Output: Area of Circle: 78.53981633974483**

**Area of Rectangle: 24.0**

**Area of Triangle: 25.0**

**Area of Square: 16.0**

**2) Create a package named StingOperation having two different classes to perform following operations:**

**i.** Concatenate a given string to the end of another string.

**ii.** Length of a given string

**iii.** Return the character at the given index within the string

**// StringOperation/StringOperations.java**

package StringOperation;

public class StringOperations {

// Concatenate two strings

public String concatenateStrings(String str1, String str2) {

return str1 + str2;

}

// Find the length of a string

public int getStringLength(String str) {

return str.length();

}

// Get the character at a specific index

public char getCharacterAtIndex(String str, int index) {

return str.charAt(index);

}

}

**// Main.java**

import StringOperation.StringOperations;

public class Main {

public static void main(String[] args) {

StringOperations stringOps = new StringOperations();

// Concatenate two strings

String str1 = "Hello";

String str2 = " World!";

System.out.println("Concatenated String: " + stringOps.concatenateStrings(str1, str2));

// Find the length of a string

String testStr = "Hello";

System.out.println("Length of string: " + stringOps.getStringLength(testStr));

// Get the character at a specific index

System.out.println("Character at index 1: " + stringOps.getCharacterAtIndex(testStr, 1));

}

}

**Output: Concatenated String: Hello World!**

**Length of string: 5**

**Character at index 1: e**

**3) Create a package named ArrayOperation having two different classes to perform following operations:**

i. Sort a numeric array

**ii. Sort a string array**

**// ArrayOperation/NumericSort.java**

package ArrayOperation;

import java.util.Arrays;

public class NumericSort {

public void sortNumericArray(int[] array) {

Arrays.sort(array);

for (int num : array) {

System.out.print(num + " ");

}

System.out.println();

}

}

**// ArrayOperation/StringSort.java**

package ArrayOperation;

import java.util.Arrays;

public class StringSort {

public void sortStringArray(String[] array) {

Arrays.sort(array);

for (String str : array) {

System.out.print(str + " ");

}

System.out.println();

}

}

**// Main.java**

import ArrayOperation.NumericSort;

import ArrayOperation.StringSort;

public class Main {

public static void main(String[] args) {

int[] numericArray = {5, 3, 8, 1, 2};

String[] stringArray = {"apple", "banana", "cherry", "date"};

NumericSort numericSorter = new NumericSort();

numericSorter.sortNumericArray(numericArray);

StringSort stringSorter = new StringSort();

stringSorter.sortStringArray(stringArray);

}

}

**Output: 1 2 3 5 8**

**apple banana cherry date**