# File: Exp1.java

/\*   
 NAME : HRISHI SUNIL PATIL  
 UIN : 231P080  
 ROLL NO : 26  
 EXP1 : Write a program to perform Menu Driven Arithmetic Operation.  
\*/  
  
import java.util.Scanner;  
  
public class Exp1 {  
 public static void main(String[] args) {  
 Scanner sc = new Scanner(System.in);  
  
 System.out.println("Enter two numbers: ");  
 double num1 = sc.nextDouble();  
 double num2 = sc.nextDouble();  
  
 System.out.println("Choose an operation:");  
 System.out.println("1. Addition (+)");  
 System.out.println("2. Subtraction (-)");  
 System.out.println("3. Multiplication (\*)");  
 System.out.println("4. Division (/)");  
 System.out.println("5. Modulus (%)");  
 int choice = sc.nextInt();  
  
 switch (choice) {  
 case 1:  
 System.out.println("Result: " + (num1 + num2));  
 break;  
 case 2:  
 System.out.println("Result: " + (num1 - num2));  
 break;  
 case 3:  
 System.out.println("Result: " + (num1 \* num2));  
 break;  
 case 4:  
 if (num2 != 0) {  
 System.out.println("Result: " + (num1 / num2));  
 } else {  
 System.out.println("Division by zero is not allowed.");  
 }  
 break;  
 case 5:  
 if (num2 != 0) {  
 System.out.println("Result: " + (num1 % num2));  
 } else {  
 System.out.println("Modulus by zero is not allowed.");  
 }  
 break;  
 default:  
 System.out.println("Invalid choice.");  
 }  
 }  
}

# File: Exp1PostLab1.java

/\*   
 NAME : HRISHI SUNIL PATIL  
 UIN : 231P080  
 ROLL NO : 26  
 EXP1 : Menu Driven Arithmetic Operations  
\*/  
import java.util.Scanner;  
  
public class Exp1PostLab1 {  
 public static void main(String[] args) {  
 Scanner scanner = new Scanner(System.in);  
 char choice;  
 double num1, num2, result;  
  
 System.out.print("Enter first number: ");  
 num1 = scanner.nextDouble();  
 System.out.print("Enter second number: ");  
 num2 = scanner.nextDouble();  
 System.out.print("Choose operation (+, -, \*, /): ");  
 choice = scanner.next().charAt(0);  
  
 switch (choice) {  
 case '+':  
 result = num1 + num2;  
 System.out.println("Result: " + result);  
 break;  
 case '-':  
 result = num1 - num2;  
 System.out.println("Result: " + result);  
 break;  
 case '\*':  
 result = num1 \* num2;  
 System.out.println("Result: " + result);  
 break;  
 case '/':  
 if (num2 != 0) {  
 result = num1 / num2;  
 System.out.println("Result: " + result);  
 } else {  
 System.out.println("Division by zero is not allowed.");  
 }  
 break;  
 default:  
 System.out.println("Invalid operation.");  
 }  
 }  
}

# File: Exp1PostLab2.java

/\*   
 NAME : HRISHI SUNIL PATIL  
 UIN : 231P080  
 ROLL NO : 26  
 EXP1 : Menu Driven Arithmetic Operations  
\*/  
import java.util.Scanner;  
  
public class Exp1PostLab2 {  
 public static void main(String[] args) {  
 Scanner scanner = new Scanner(System.in);  
 System.out.print("Enter month number (1-12): ");  
 int month = scanner.nextInt();  
 String monthName;  
  
 switch (month) {  
 case 1: monthName = "January"; break;  
 case 2: monthName = "February"; break;  
 case 3: monthName = "March"; break;  
 case 4: monthName = "April"; break;  
 case 5: monthName = "May"; break;  
 case 6: monthName = "June"; break;  
 case 7: monthName = "July"; break;  
 case 8: monthName = "August"; break;  
 case 9: monthName = "September"; break;  
 case 10: monthName = "October"; break;  
 case 11: monthName = "November"; break;  
 case 12: monthName = "December"; break;  
 default: monthName = "Invalid month number."; break;  
 }  
  
 System.out.println("Month: " + monthName);  
 }  
}

# File: Exp2.java

/\*   
 NAME : HRISHI SUNIL PATIL  
 UIN : 231P080  
 ROLL NO : 26  
 EXP2 : Write a program to print following pattern using   
 labelled break and continue statement.  
\*/  
import java.util.\*;  
  
public class Exp2 {  
 public static void main(String[] args) {  
 outer:  
 for (int row = 1; row <= 6; row++) {  
 if (row == 6) {  
 break outer;  
 }  
  
 for (int column = 1; column <= 6; column++) {  
 if (column > row) {  
 continue;  
 }  
 System.out.print("\* ");  
 }  
 System.out.println();  
 }  
 }  
}

# File: Exp2PostLab1.java

/\*   
 NAME : HRISHI SUNIL PATIL  
 UIN : 231P080  
 ROLL NO : 26  
 EXP2 : Pattern Using Labelled Break and Continue Statement  
\*/  
public class Exp2PostLab1 {  
 public static void main(String[] args) {  
 for (int i = 1; i <= 5; i++) {  
 System.out.println(i);  
 if (i == 5) break;  
 }  
 }  
}

# File: Exp2PostLab2.java

/\*   
 NAME : HRISHI SUNIL PATIL  
 UIN : 231P080  
 ROLL NO : 26  
 EXP2 : Pattern Using Labelled Break and Continue Statement  
\*/  
public class Exp2PostLab2 {  
 public static void main(String[] args) {  
 for (int i = 1; i <= 10; i++) {  
 if (i == 5) continue;  
 System.out.println(i);  
 }  
 }  
}

# File: Exp2PostLab3.java

/\*   
 NAME : HRISHI SUNIL PATIL  
 UIN : 231P080  
 ROLL NO : 26  
 EXP2 : Pattern Using Labelled Break and Continue Statement  
\*/  
public class Exp2PostLab3 {  
 public static void main(String[] args) {  
 for (int row = 1; row <= 3; row++) {  
 for (int col = 1; col <= row; col++) {  
 System.out.print(col + " ");  
 }  
 System.out.println();  
 }  
 }  
}

# File: Exp3.java

/\*   
 NAME : HRISHI SUNIL PATIL  
 UIN : 231P080  
 ROLL NO : 26  
 EXP3 : Write a program to create a class Account to perform the   
 operation of insert, deposit and withdrawal of single   
 employee and make use of object.  
\*/  
import java.util.Scanner;  
  
class Account {  
 int accountNumber;  
 String accountHolderName;  
 double balance;  
  
 void insert(int accNo, String name, double initialBalance) {  
 accountNumber = accNo;  
 accountHolderName = name;  
 balance = initialBalance;  
 }  
  
 void deposit(double amount) {  
 balance += amount;  
 }  
  
 void withdraw(double amount) {  
 if (amount <= balance) {  
 balance -= amount;  
 } else {  
 System.out.println("Insufficient balance.");  
 }  
 }  
  
 void checkBalance() {  
 System.out.println("Balance: " + balance);  
 }  
  
 void display() {  
 System.out.println("Account Number: " + accountNumber);  
 System.out.println("Account Holder Name: " + accountHolderName);  
 System.out.println("Balance: " + balance);  
 }  
}  
  
public class Exp3 {  
 public static void main(String[] args) {  
 Account acc = new Account();  
 Scanner sc = new Scanner(System.in);  
  
 System.out.println("Enter account number:");  
 int accNo = sc.nextInt();  
 sc.nextLine();  
 System.out.println("Enter account holder name:");  
 String name = sc.nextLine();  
 System.out.println("Enter initial balance:");  
 double balance = sc.nextDouble();  
  
 acc.insert(accNo, name, balance);  
 acc.display();  
  
 System.out.println("Enter amount to deposit:");  
 double depositAmount = sc.nextDouble();  
 acc.deposit(depositAmount);  
 acc.checkBalance();  
  
 System.out.println("Enter amount to withdraw:");  
 double withdrawAmount = sc.nextDouble();  
 acc.withdraw(withdrawAmount);  
 acc.checkBalance();  
 }  
}

# File: Exp3PostLab1.java

/\*   
 NAME : HRISHI SUNIL PATIL  
 UIN : 231P080  
 ROLL NO : 26  
 EXP3 : Create a Class Account to Perform Insert, Deposit, and Withdrawal Operations  
\*/  
public class Exp3PostLab1 {  
 public static int gcd(int a, int b) {  
 if (b == 0) return a;  
 return gcd(b, a % b);  
 }  
  
 public static void main(String[] args) {  
 int num1 = 56, num2 = 98;  
 System.out.println("GCD of " + num1 + " and " + num2 + " is: " + gcd(num1, num2));  
 }  
}

# File: Exp3PostLab2.java

/\*   
 NAME : HRISHI SUNIL PATIL  
 UIN : 231P080  
 ROLL NO : 26  
 EXP3 : Create a Class Account to Perform Insert, Deposit, and Withdrawal Operations  
\*/  
import java.util.Scanner;  
  
public class Exp3PostLab2 {  
 static class Circle {  
 private double radius;  
   
 public void acceptRadius() {  
 Scanner sc = new Scanner(System.in);  
 System.out.print("Enter radius: ");  
 radius = sc.nextDouble();  
 }  
  
 public double calculateArea() {  
 return Math.PI \* radius \* radius;  
 }  
  
 public void displayArea() {  
 System.out.println("The area of the circle is: " + calculateArea());  
 }  
 }  
  
 public static void main(String[] args) {  
 Circle circle = new Circle();  
 circle.acceptRadius();  
 circle.displayArea();  
 }  
}

# File: Exp4PostLab1.java

/\*   
 NAME : HRISHI SUNIL PATIL  
 UIN : 231P080  
 ROLL NO : 26  
 EXP4 : Find Area of Circle Using Method Overloading and Constructor Overloading  
\*/  
import java.util.Scanner;  
  
public class Exp4PostLab1 {  
 public double area(double radius) {  
 return Math.PI \* radius \* radius;  
 }  
  
 public double area(double length, double width) {  
 return length \* width;  
 }  
  
 public double area(double base, double height, boolean isTriangle) {  
 return 0.5 \* base \* height;  
 }  
  
 public static void main(String[] args) {  
 Exp4PostLab1 shape = new Exp4PostLab1();  
 Scanner sc = new Scanner(System.in);  
  
 System.out.print("Enter radius of circle: ");  
 double radius = sc.nextDouble();  
 System.out.println("Area of Circle: " + shape.area(radius));  
  
 System.out.print("Enter length and width of rectangle: ");  
 double length = sc.nextDouble();  
 double width = sc.nextDouble();  
 System.out.println("Area of Rectangle: " + shape.area(length, width));  
  
 System.out.print("Enter base and height of triangle: ");  
 double base = sc.nextDouble();  
 double height = sc.nextDouble();  
 System.out.println("Area of Triangle: " + shape.area(base, height, true));  
 }  
}

# File: Exp4PostLab2.java

/\*   
 NAME : HRISHI SUNIL PATIL  
 UIN : 231P080  
 ROLL NO : 26  
 EXP4 : Find Area of Circle Using Method and Constructor Overloading  
\*/  
public class Exp4PostLab2 {  
  
 public int add(int a, int b) {  
 return a + b;  
 }  
  
 public String add(String s1, String s2) {  
 return s1 + s2;  
 }  
  
 public static void main(String[] args) {  
 Exp4PostLab2 obj = new Exp4PostLab2();  
 System.out.println("Sum of integers: " + obj.add(10, 20));  
 System.out.println("Concatenation of strings: " + obj.add("Hello, ", "World!"));  
 }  
}

# File: Exp4PostLab3.java

/\*   
 NAME : HRISHI SUNIL PATIL  
 UIN : 231P080  
 ROLL NO : 26  
 EXP4 : Find Area of Circle Using Method and Constructor Overloading  
\*/  
public class Exp4PostLab3 {  
  
 public Exp4PostLab3(double radius) {  
 System.out.println("Area of Circle: " + (Math.PI \* radius \* radius));  
 }  
  
 public Exp4PostLab3(double length, double breadth) {  
 System.out.println("Area of Rectangle: " + (length \* breadth));  
 }  
  
 public Exp4PostLab3(double base, double height, boolean isTriangle) {  
 System.out.println("Area of Triangle: " + (0.5 \* base \* height));  
 }  
  
 public static void main(String[] args) {  
 new Exp4PostLab3(4); // Circle  
 new Exp4PostLab3(5, 7); // Rectangle  
 new Exp4PostLab3(6, 8, true); // Triangle  
 }  
}

# File: Exp4PostLab4.java

/\*   
 NAME : HRISHI SUNIL PATIL  
 UIN : 231P080  
 ROLL NO : 26  
 EXP4 : Find Area of Circle Using Method and Constructor Overloading  
\*/  
public class Exp4PostLab4 {  
 private int num1;  
 private int num2;  
  
 public Exp4PostLab4() {  
 this.num1 = 56;  
 this.num2 = 98;  
 }  
  
 public int calculateGCD(int a, int b) {  
 if (b == 0) return a;  
 return calculateGCD(b, a % b);  
 }  
  
 public void display() {  
 System.out.println("GCD of " + num1 + " and " + num2 + " is: " + calculateGCD(num1, num2));  
 }  
  
 public static void main(String[] args) {  
 Exp4PostLab4 obj = new Exp4PostLab4();  
 obj.display();  
 }  
}

# File: Exp4\_1.java

/\*   
 NAME : HRISHI SUNIL PATIL  
 UIN : 231P080  
 ROLL NO : 26  
 EXP4 : Write a program to find Area of Circle using   
 (i) method overloading   
 (ii) constructor overloading  
\*/  
class AreaOfMethodOverload {  
 double area(double radius) {  
 return Math.PI \* radius \* radius;  
 }  
  
 double area(double radius, double piValue) {  
 return piValue \* radius \* radius;  
 }  
}  
  
public class Exp4\_1 {  
 public static void main(String[] args) {  
 AreaOfMethodOverload obj = new AreaOfMethodOverload();  
 double radius = 5;  
  
 System.out.println("Area with default PI: " + obj.area(radius));  
 System.out.println("Area with custom PI: " + obj.area(radius, 3.14));  
 }  
}

# File: Exp4\_2.java

/\*   
 NAME : HRISHI SUNIL PATIL  
 UIN : 231P080  
 ROLL NO : 26  
 EXP4 : Write a program to find Area of Circle using   
 (i) method overloading   
 (ii) constructor overloading  
\*/  
class AreaOf {  
 double radius;  
  
 AreaOf() {  
 radius = 1.0;  
 }  
  
 AreaOf(double r) {  
 radius = r;  
 }  
  
 double findArea() {  
 return Math.PI \* radius \* radius;  
 }  
}  
  
public class Exp4\_2 {  
 public static void main(String[] args) {  
 AreaOf defaultCircle = new AreaOf();  
 AreaOf customCircle = new AreaOf(5);  
  
 System.out.println("Area of default circle: " + defaultCircle.findArea());  
 System.out.println("Area of custom circle: " + customCircle.findArea());  
 }  
}

# File: Exp5PostLab1.java

/\*   
 NAME : HRISHI SUNIL PATIL  
 UIN : 231P080  
 ROLL NO : 26  
 EXP5 : Matrix Addition and Count Frequency of a Letter in String  
\*/  
public class Exp5PostLab1 {  
  
 public static void main(String[] args) {  
 int[][] matrix1 = { {1, 2}, {3, 4} };  
 int[][] matrix2 = { {5, 6}, {7, 8} };  
 int[][] result = new int[2][2];  
  
 for (int i = 0; i < 2; i++) {  
 for (int j = 0; j < 2; j++) {  
 result[i][j] = 0;  
 for (int k = 0; k < 2; k++) {  
 result[i][j] += matrix1[i][k] \* matrix2[k][j];  
 }  
 }  
 }  
  
 for (int i = 0; i < 2; i++) {  
 for (int j = 0; j < 2; j++) {  
 System.out.print(result[i][j] + " ");  
 }  
 System.out.println();  
 }  
 }  
}

# File: Exp5PostLab2.java

/\*   
 NAME : HRISHI SUNIL PATIL  
 UIN : 231P080  
 ROLL NO : 26  
 EXP5 : Matrix Addition and Count Frequency of a Letter in String  
\*/  
public class Exp5PostLab2 {  
  
 public static void main(String[] args) {  
 int[][] matrix = { {1, 2, 3}, {4, 5, 6}, {7, 8, 9} };  
 int sum = 0;  
  
 for (int i = 0; i < 3; i++) {  
 sum += matrix[i][i]; // Adding primary diagonal elements  
 }  
  
 System.out.println("Sum of diagonal elements: " + sum);  
 }  
}

# File: Exp5PostLab3.java

/\*   
 NAME : HRISHI SUNIL PATIL  
 UIN : 231P080  
 ROLL NO : 26  
 EXP5 : Matrix Addition and Count Frequency of a Letter in String  
\*/  
public class Exp5PostLab3 {  
  
 public static void main(String[] args) {  
 String input = "Programming is fun!";  
 int vowelCount = 0;  
 String vowels = "AEIOUaeiou";  
  
 for (int i = 0; i < input.length(); i++) {  
 if (vowels.indexOf(input.charAt(i)) != -1) {  
 vowelCount++;  
 }  
 }  
  
 System.out.println("Number of vowels: " + vowelCount);  
 }  
}

# File: Exp5PostLab4.java

/\*   
 NAME : HRISHI SUNIL PATIL  
 UIN : 231P080  
 ROLL NO : 26  
 EXP5 : Matrix Addition and Count Frequency of a Letter in String  
\*/  
public class Exp5PostLab4 {  
  
 public static void main(String[] args) {  
 String str = "Hello World";  
  
 System.out.println("Length of the string: " + str.length());  
 System.out.println("Character at index 4: " + str.charAt(4));  
 System.out.println("Substring (0, 5): " + str.substring(0, 5));  
 System.out.println("Index of 'o': " + str.indexOf('o'));  
 System.out.println("String in uppercase: " + str.toUpperCase());  
 }  
}

# File: Exp5\_1.java

/\*   
 NAME : HRISHI SUNIL PATIL  
 UIN : 231P080  
 ROLL NO : 26  
 EXP5 : Write a program in java to perform   
 (i) Matrix Addition   
 (ii) Count frequency   
 of a given letter in a String.  
\*/  
import java.util.Scanner;  
  
class Exp5\_1 {  
 public static void main(String[] args) {  
 int i, j;  
 int[][] set1 = new int[3][3];  
 int[][] set2 = new int[3][3];  
 int[][] add = new int[3][3];  
  
 Scanner sc = new Scanner(System.in);  
  
 System.out.println("Enter the values of the first matrix:");  
 for (i = 0; i < 3; i++) {  
 for (j = 0; j < 3; j++) {  
 set1[i][j] = sc.nextInt();  
 }  
 }  
  
 System.out.println("Enter the values of the second matrix:");  
 for (i = 0; i < 3; i++) {  
 for (j = 0; j < 3; j++) {  
 set2[i][j] = sc.nextInt();  
 }  
 }  
  
 // Adding the matrices  
 for (i = 0; i < 3; i++) {  
 for (j = 0; j < 3; j++) {  
 add[i][j] = set1[i][j] + set2[i][j];  
 }  
 }  
  
 System.out.println("The resultant matrix after addition is:");  
 for (i = 0; i < 3; i++) {  
 for (j = 0; j < 3; j++) {  
 System.out.print(add[i][j] + " ");  
 }  
 System.out.println();  
 }  
 }  
}

# File: Exp5\_2.java

/\*   
 NAME : HRISHI SUNIL PATIL  
 UIN : 231P080  
 ROLL NO : 26  
 EXP5 : Write a program in java to perform   
 (i) Matrix Addition   
 (ii) Count frequency   
 of a given letter in a String.  
\*/  
import java.util.Scanner;  
  
class Exp5\_2 {  
 public static void main(String[] args) {  
 Scanner sc = new Scanner(System.in);  
  
 System.out.println("Enter a string:");  
 String inputString = sc.nextLine();  
  
 System.out.println("Enter the character to find its frequency:");  
 char letter = sc.next().charAt(0);  
  
 int count = 0;  
 for (int i = 0; i < inputString.length(); i++) {  
 if (inputString.charAt(i) == letter) {  
 count++;  
 }  
 }  
  
 System.out.println("The frequency of '" + letter + "' in the string is: " + count);  
 }  
}

# File: Exp6PostLab1.java

/\*   
 NAME : HRISHI SUNIL PATIL  
 UIN : 231P080  
 ROLL NO : 26  
 EXP6 : Vector Operations and String Buffer Functions  
\*/  
import java.util.\*;  
  
public class Exp6PostLab1 {  
 public static void main(String[] args) {  
 Vector<String> students = new Vector<>();  
 Scanner sc = new Scanner(System.in);  
 int choice;  
  
 do {  
 System.out.println("1. Add Student Name\n2. Remove Student Name\n3. Display Names\n4. Exit");  
 choice = sc.nextInt();  
 sc.nextLine(); // consume newline  
  
 switch (choice) {  
 case 1:  
 System.out.println("Enter student name: ");  
 String name = sc.nextLine();  
 students.add(name);  
 break;  
 case 2:  
 System.out.println("Enter student name to remove: ");  
 String removeName = sc.nextLine();  
 students.remove(removeName);  
 break;  
 case 3:  
 Enumeration<String> names = students.elements();  
 System.out.println("Student Names:");  
 while (names.hasMoreElements()) {  
 System.out.println(names.nextElement());  
 }  
 break;  
 }  
 } while (choice != 4);  
 sc.close();  
 }  
}

# File: Exp6PostLab2.java

/\*   
 NAME : HRISHI SUNIL PATIL  
 UIN : 231P080  
 ROLL NO : 26  
 EXP6 : Vector Operations and String Buffer Functions  
\*/  
import java.util.\*;  
  
public class Exp6PostLab2 {  
 public static void main(String[] args) {  
 Vector<String> shoppingList = new Vector<>();  
 Scanner sc = new Scanner(System.in);  
 int choice;  
  
 do {  
 System.out.println("1. Add Item\n2. Delete Item\n3. Display Items\n4. Exit");  
 choice = sc.nextInt();  
 sc.nextLine(); // consume newline  
  
 switch (choice) {  
 case 1:  
 System.out.println("Enter item name: ");  
 String item = sc.nextLine();  
 System.out.println("Enter position to insert item: ");  
 int position = sc.nextInt();  
 sc.nextLine();  
 shoppingList.add(position, item);  
 break;  
 case 2:  
 System.out.println("Enter item name to delete: ");  
 String removeItem = sc.nextLine();  
 shoppingList.remove(removeItem);  
 break;  
 case 3:  
 System.out.println("Shopping List: " + shoppingList);  
 break;  
 }  
 } while (choice != 4);  
 sc.close();  
 }  
}

# File: Exp6PostLab3.java

/\*   
 NAME : HRISHI SUNIL PATIL  
 UIN : 231P080  
 ROLL NO : 26  
 EXP6 : Vector Operations and String Buffer Functions  
\*/  
public class Exp6PostLab3 {  
  
 public static void main(String[] args) {  
 StringBuffer sb = new StringBuffer("Hello World");  
 System.out.println("Original String: " + sb);  
   
 sb.delete(5, 11); // Deletes " World"  
 System.out.println("After deletion: " + sb);  
 }  
}

# File: Exp6PostLab4.java

/\*   
 NAME : HRISHI SUNIL PATIL  
 UIN : 231P080  
 ROLL NO : 26  
 EXP6 : Vector Operations and String Buffer Functions  
\*/  
public class Exp6PostLab4 {  
  
 public static void main(String[] args) {  
 StringBuffer sb = new StringBuffer("Hello World");  
 System.out.println("Original String: " + sb);  
   
 sb.replace(6, 11, "Java"); // Replaces "World" with "Java"  
 System.out.println("After replacement: " + sb);  
 }  
}

# File: Exp6\_1.java

/\*   
 NAME : HRISHI SUNIL PATIL  
 UIN : 231P080  
 ROLL NO : 26  
 EXP6 : Write a program in java to perform   
 (i) Vector operations   
 (ii) String Buffer functions  
\*/  
import java.util.Scanner;  
  
class Exp6\_1 {  
 public static void main(String[] args) {  
 Scanner sc = new Scanner(System.in);  
  
 System.out.println("Enter a string to check if it's a palindrome:");  
 String inputString = sc.nextLine();  
  
 // Append the string to StringBuffer and reverse it  
 StringBuffer sb = new StringBuffer(inputString);  
 sb.reverse();  
  
 // Convert reversed StringBuffer to String  
 String reversedString = sb.toString();  
  
 // Compare the original string with the reversed string  
 if (inputString.equals(reversedString)) {  
 System.out.println(inputString + " is a palindrome.");  
 } else {  
 System.out.println(inputString + " is not a palindrome.");  
 }  
 }  
}

# File: Exp6\_2.java

/\*   
 NAME : HRISHI SUNIL PATIL  
 UIN : 231P080  
 ROLL NO : 26  
 EXP6 : Write a program in java to perform   
 (i) Vector operations   
 (ii) String Buffer functions  
\*/  
import java.util.Vector;  
import java.util.Scanner;  
  
class Exp6\_2 {  
 public static void main(String[] args) {  
 Vector<String> shoppingList = new Vector<>();  
 Scanner sc = new Scanner(System.in);  
  
 System.out.println("Enter the number of items you want to add:");  
 int n = sc.nextInt();  
 sc.nextLine(); // Consume the newline  
  
 System.out.println("Enter the items:");  
 for (int i = 0; i < n; i++) {  
 String item = sc.nextLine();  
 shoppingList.add(item);  
 }  
  
 System.out.println("Items in the vector: " + shoppingList);  
  
 // Copy vector elements into a string  
 String allItems = String.join(", ", shoppingList);  
  
 System.out.println("All items as a single string: " + allItems);  
 }  
}

# File: Exp7.java

/\*   
 NAME : HRISHI SUNIL PATIL  
 UIN : 231P080  
 ROLL NO : 26  
 EXP7 : Write a program to implement single and multilevel   
 inheritance using super keyword.  
\*/  
// Base class  
class Person {  
 String name;  
  
 Person(String name) {  
 this.name = name;  
 }  
  
 void displayPersonInfo() {  
 System.out.println("Name: " + name);  
 }  
}  
  
// Single Inheritance: Child class extending Person  
class Online extends Person {  
 String course;  
  
 Online(String name, String course) {  
 super(name); // Calling the constructor of Person class  
 this.course = course;  
 }  
  
 void displayOnlineInfo() {  
 System.out.println("Course: " + course);  
 }  
}  
  
// Another single inheritance: Child class extending Person  
class SavingAccount extends Person {  
 double balance;  
  
 SavingAccount(String name, double balance) {  
 super(name); // Calling the constructor of Person class  
 this.balance = balance;  
 }  
  
 void displaySavingAccountInfo() {  
 System.out.println("Balance: $" + balance);  
 }  
}  
  
// Multilevel Inheritance: Child class extending SavingAccount  
class AccountDetails extends SavingAccount {  
 String accountNumber;  
  
 AccountDetails(String name, double balance, String accountNumber) {  
 super(name, balance); // Calling the constructor of SavingAccount class  
 this.accountNumber = accountNumber;  
 }  
  
 void displayAccountDetails() {  
 System.out.println("Account Number: " + accountNumber);  
 }  
}  
  
// Main class  
public class Exp7 {  
 public static void main(String[] args) {  
 // Creating object of Online class (Single Inheritance)  
 Online onlineStudent = new Online("John", "Java Programming");  
 onlineStudent.displayPersonInfo();  
 onlineStudent.displayOnlineInfo();  
  
 System.out.println();  
  
 // Creating object of AccountDetails class (Multilevel Inheritance)  
 AccountDetails account = new AccountDetails("Alice", 1500.75, "ACC12345");  
 account.displayPersonInfo();  
 account.displaySavingAccountInfo();  
 account.displayAccountDetails();  
 }  
}

# File: Exp7PostLab1.java

/\*   
 NAME : HRISHI SUNIL PATIL  
 UIN : 231P080  
 ROLL NO : 26  
 EXP7 : Single and Multilevel Inheritance using super keyword  
\*/  
import java.util.Scanner;  
  
class Radius {  
 double radius;  
  
 public void acceptRadius() {  
 Scanner scanner = new Scanner(System.in);  
 System.out.print("Enter radius: ");  
 radius = scanner.nextDouble();  
 }  
}  
  
class Circle extends Radius {  
 public double findArea() {  
 return Math.PI \* radius \* radius;  
 }  
}  
  
class Sphere extends Circle {  
 public double findVolume() {  
 return (4.0 / 3.0) \* Math.PI \* Math.pow(radius, 3);  
 }  
  
 public void displayVolume() {  
 System.out.println("Volume of Sphere: " + findVolume());  
 }  
}  
  
public class Exp7PostLab1 {  
  
 public static void main(String[] args) {  
 Sphere sphere = new Sphere();  
 sphere.acceptRadius();  
 sphere.displayVolume();  
 }  
}

# File: Exp7PostLab2.java

/\*   
 NAME : HRISHI SUNIL PATIL  
 UIN : 231P080  
 ROLL NO : 26  
 EXP7 : Single and Multilevel Inheritance using super keyword  
\*/  
import java.util.Scanner;  
  
class RadiusBase {  
 double radius;  
  
 public void acceptRadius() {  
 Scanner scanner = new Scanner(System.in);  
 System.out.print("Enter radius: ");  
 radius = scanner.nextDouble();  
 }  
  
 public void display() {  
 System.out.println("This is the base class display method.");  
 }  
}  
  
class CircleDerived extends RadiusBase {  
 public double findArea() {  
 return Math.PI \* radius \* radius;  
 }  
  
 @Override  
 public void display() {  
 System.out.println("Area of Circle: " + findArea());  
 }  
}  
  
class SphereDerived extends CircleDerived {  
 public double findVolume() {  
 return (4.0 / 3.0) \* Math.PI \* Math.pow(radius, 3);  
 }  
  
 @Override  
 public void display() {  
 System.out.println("Volume of Sphere: " + findVolume());  
 }  
}  
  
public class Exp7PostLab2 {  
  
 public static void main(String[] args) {  
 SphereDerived sphere = new SphereDerived();  
 sphere.acceptRadius();  
 sphere.display();  
 }  
}

# File: Exp8.java

/\*   
 NAME : HRISHI SUNIL PATIL  
 UIN : 231P080  
 ROLL NO : 26  
 EXP8 : Write a program to implement interface demonstrating the concept of   
 multiple inheritance.  
\*/  
class Student {  
 String name;  
 int rollNo;  
  
 Student(String name, int rollNo) {  
 this.name = name;  
 this.rollNo = rollNo;  
 }  
  
 void displayStudentInfo() {  
 System.out.println("Name: " + name);  
 System.out.println("Roll No: " + rollNo);  
 }  
}  
  
// Single inheritance  
class Test extends Student {  
 int marks1, marks2;  
  
 Test(String name, int rollNo, int marks1, int marks2) {  
 super(name, rollNo); // Calling constructor of Student class  
 this.marks1 = marks1;  
 this.marks2 = marks2;  
 }  
  
 void displayTestMarks() {  
 System.out.println("Marks1: " + marks1);  
 System.out.println("Marks2: " + marks2);  
 }  
}  
  
// Interface   
interface Sports {  
 int sportsMarks = 10;   
  
 void displaySportsMarks();   
}  
  
// Multiple inheritance  
class Results extends Test implements Sports {  
 int totalMarks;  
  
 Results(String name, int rollNo, int marks1, int marks2) {  
 super(name, rollNo, marks1, marks2);  
 this.totalMarks = marks1 + marks2 + sportsMarks;  
 }  
  
 public void displaySportsMarks() {  
 System.out.println("Sports Marks: " + sportsMarks);  
 }  
  
 void displayTotalMarks() {  
 System.out.println("Total Marks (including sports): " + totalMarks);  
 }  
}  
  
public class Exp8 {  
 public static void main(String[] args) {  
 Results result = new Results("Alice", 101, 85, 90);  
  
 result.displayStudentInfo();  
 result.displayTestMarks();  
 result.displaySportsMarks();  
 result.displayTotalMarks();  
 }  
}

# File: Exp8PostLab1.java

/\*   
 NAME : HRISHI SUNIL PATIL  
 UIN : 231P080  
 ROLL NO : 26  
 EXP8 : Interface demonstrating the concept of multiple inheritance  
\*/  
  
import java.util.Scanner;  
  
interface Matrix {  
 int M = 2, N = 2;  
 void readMatrix();  
 void displayMatrix();  
 void addMatrix();  
}  
  
class MatrixOperations implements Matrix {  
 int[][] matrix1 = new int[M][N];  
 int[][] matrix2 = new int[M][N];  
 int[][] result = new int[M][N];  
   
 @Override  
 public void readMatrix() {  
 Scanner scanner = new Scanner(System.in);  
 System.out.println("Enter elements for Matrix 1:");  
 for (int i = 0; i < M; i++) {  
 for (int j = 0; j < N; j++) {  
 matrix1[i][j] = scanner.nextInt();  
 }  
 }  
   
 System.out.println("Enter elements for Matrix 2:");  
 for (int i = 0; i < M; i++) {  
 for (int j = 0; j < N; j++) {  
 matrix2[i][j] = scanner.nextInt();  
 }  
 }  
 }  
   
 @Override  
 public void displayMatrix() {  
 System.out.println("Resultant Matrix after Addition:");  
 for (int i = 0; i < M; i++) {  
 for (int j = 0; j < N; j++) {  
 System.out.print(result[i][j] + " ");  
 }  
 System.out.println();  
 }  
 }  
   
 @Override  
 public void addMatrix() {  
 for (int i = 0; i < M; i++) {  
 for (int j = 0; j < N; j++) {  
 result[i][j] = matrix1[i][j] + matrix2[i][j];  
 }  
 }  
 }  
}  
  
public class Exp8PostLab1 {  
 public static void main(String[] args) {  
 MatrixOperations matOps = new MatrixOperations();  
 matOps.readMatrix();  
 matOps.addMatrix();  
 matOps.displayMatrix();  
 }  
}

# File: Exp8PostLab2.java

/\*   
 NAME : HRISHI SUNIL PATIL  
 UIN : 231P080  
 ROLL NO : 26  
 EXP8 : Interface demonstrating the concept of multiple inheritance  
\*/  
  
import java.util.Scanner;  
  
interface Matrix {  
 int M = 2, N = 2;  
 void readMatrix();  
 void displayMatrix();  
 void sum\_Diagonal\_Matrix();  
}  
  
class DiagonalMatrixOperations implements Matrix {  
 int[][] matrix = new int[M][N];  
   
 @Override  
 public void readMatrix() {  
 Scanner scanner = new Scanner(System.in);  
 System.out.println("Enter elements for the Matrix:");  
 for (int i = 0; i < M; i++) {  
 for (int j = 0; j < N; j++) {  
 matrix[i][j] = scanner.nextInt();  
 }  
 }  
 }  
   
 @Override  
 public void displayMatrix() {  
 System.out.println("Matrix:");  
 for (int i = 0; i < M; i++) {  
 for (int j = 0; j < N; j++) {  
 System.out.print(matrix[i][j] + " ");  
 }  
 System.out.println();  
 }  
 }  
   
 @Override  
 public void sum\_Diagonal\_Matrix() {  
 int sum = 0;  
 for (int i = 0; i < M; i++) {  
 sum += matrix[i][i]; // Summing diagonal elements  
 }  
 System.out.println("Sum of Diagonal Elements: " + sum);  
 }  
}  
  
public class Exp8PostLab2 {  
 public static void main(String[] args) {  
 DiagonalMatrixOperations diagOps = new DiagonalMatrixOperations();  
 diagOps.readMatrix();  
 diagOps.displayMatrix();  
 diagOps.sum\_Diagonal\_Matrix();  
 }  
}

# File: Exp9.java

/\*   
 NAME : HRISHI SUNIL PATIL  
 UIN : 231P080  
 ROLL NO : 26  
 EXP9 : Write a program to calculate area of Rectangle and Circle using abstract class.  
\*/  
abstract class Shape {  
 abstract void calculateArea();  
}  
  
class Rectangle extends Shape {  
 int length, breadth;  
  
 Rectangle(int length, int breadth) {  
 this.length = length;  
 this.breadth = breadth;  
 }  
  
 void calculateArea() {  
 int area = length \* breadth;  
 System.out.println("Area of Rectangle: " + area);  
 }  
}  
  
class Circle extends Shape {  
 double radius;  
  
 Circle(double radius) {  
 this.radius = radius;  
 }  
  
 void calculateArea() {  
 double area = Math.PI \* radius \* radius;  
 System.out.println("Area of Circle: " + area);  
 }  
}  
  
public class Exp9 {  
 public static void main(String[] args) {  
 Rectangle rectangle = new Rectangle(5, 3);  
 Circle circle = new Circle(7.0);  
  
 rectangle.calculateArea();  
 circle.calculateArea();  
 }  
}

# File: Exp9PostLab1.java

/\*   
 NAME : HRISHI SUNIL PATIL  
 UIN : 231P080  
 ROLL NO : 26  
 EXP9 : Calculate area of Rectangle and Circle using abstract class  
\*/  
  
abstract class Shape {  
 abstract double volume();  
}  
  
class Sphere extends Shape {  
 double radius;  
  
 Sphere(double radius) {  
 this.radius = radius;  
 }  
  
 @Override  
 double volume() {  
 return (4.0 / 3.0) \* Math.PI \* Math.pow(radius, 3);  
 }  
}  
  
class Hemisphere extends Shape {  
 double radius;  
  
 Hemisphere(double radius) {  
 this.radius = radius;  
 }  
  
 @Override  
 double volume() {  
 return (2.0 / 3.0) \* Math.PI \* Math.pow(radius, 3);  
 }  
}  
  
public class Exp9PostLab1 {  
 public static void main(String[] args) {  
 Sphere sphere = new Sphere(5);  
 Hemisphere hemisphere = new Hemisphere(5);  
   
 System.out.println("Volume of Sphere: " + sphere.volume());  
 System.out.println("Volume of Hemisphere: " + hemisphere.volume());  
 }  
}

# File: Exp9PostLab2.java

/\*   
 NAME : HRISHI SUNIL PATIL  
 UIN : 231P080  
 ROLL NO : 26  
 EXP9 : Calculate area of Rectangle and Circle using abstract class  
\*/  
  
abstract class Shape {  
 abstract double area();  
}  
  
class Rectangle extends Shape {  
 double length, width;  
  
 Rectangle(double length, double width) {  
 this.length = length;  
 this.width = width;  
 }  
  
 @Override  
 double area() {  
 return length \* width;  
 }  
}  
  
class Square extends Shape {  
 double side;  
  
 Square(double side) {  
 this.side = side;  
 }  
  
 @Override  
 double area() {  
 return side \* side;  
 }  
}  
  
public class Exp9PostLab2 {  
 public static void main(String[] args) {  
 Rectangle rectangle = new Rectangle(5, 3);  
 Square square = new Square(4);  
   
 System.out.println("Area of Rectangle: " + rectangle.area());  
 System.out.println("Area of Square: " + square.area());  
 }  
}