WEEK 1

1.Write a java program that prints all real solutions to the quadratic equation ax2+bx+c=0. Read in a, b, c and use the quadratic formula.

import java.util.Scanner;

public class QuadraticEquationSolver {

public static void main(String[] args) {

// Create a Scanner object for reading input

Scanner scanner = new Scanner(System.in);

// Prompt the user to enter coefficients a, b, and c

System.out.print("Enter coefficient a: ");

double a = scanner.nextDouble();

System.out.print("Enter coefficient b: ");

double b = scanner.nextDouble();

System.out.print("Enter coefficient c: ");

double c = scanner.nextDouble();

// Check if the equation is quadratic

if (a == 0) {

System.out.println("This is not a quadratic equation (a cannot be 0).");

} else {

// Calculate the discriminant

double discriminant = b \* b - 4 \* a \* c;

if (discriminant > 0) {

// Two distinct real solutions

double root1 = (-b + Math.sqrt(discriminant)) / (2 \* a);

double root2 = (-b - Math.sqrt(discriminant)) / (2 \* a);

System.out.println("The equation has two real solutions: " + root1 + " and " + root2);

} else if (discriminant == 0) {

// One real solution

double root = -b / (2 \* a);

System.out.println("The equation has one real solution: " + root);

} else {

// No real solutions

System.out.println("The equation has no real solutions.");

}

}

// Close the scanner to prevent resource leaks

scanner.close();

}

}

2.Write a Java program to find largest of the three given numbers.

import java.util.Scanner;

public class LargestOfThreeNumbers {

public static void main(String[] args) {

// Create a Scanner object for reading input

Scanner scanner = new Scanner(System.in);

// Prompt the user to enter three numbers

System.out.print("Enter the first number: ");

double num1 = scanner.nextDouble();

System.out.print("Enter the second number: ");

double num2 = scanner.nextDouble();

System.out.print("Enter the third number: ");

double num3 = scanner.nextDouble();

// Determine the largest number

double largest;

if (num1 >= num2 && num1 >= num3) {

largest = num1;

} else if (num2 >= num1 && num2 >= num3) {

largest = num2;

} else {

largest = num3;

}

// Display the largest number

System.out.println("The largest number is: " + largest);

// Close the scanner to prevent resource leaks

scanner.close();

}

}

3. Write a Java program to find smallest of the three given numbers.

import java.util.Scanner;

public class SmallestOfThreeNumbers {

public static void main(String[] args) {

// Create a Scanner object for reading input

Scanner scanner = new Scanner(System.in);

// Prompt the user to enter three numbers

System.out.print("Enter the first number: ");

double num1 = scanner.nextDouble();

System.out.print("Enter the second number: ");

double num2 = scanner.nextDouble();

System.out.print("Enter the third number: ");

double num3 = scanner.nextDouble();

// Determine the smallest number

double smallest;

if (num1 <= num2 && num1 <= num3) {

smallest = num1;

} else if (num2 <= num1 && num2 <= num3) {

smallest = num2;

} else {

smallest = num3;

}

// Display the smallest number

System.out.println("The smallest number is: " + smallest);

// Close the scanner to prevent resource leaks

scanner.close();

}

}

4. Write a Java program to find the given two numbers are equal or less than the other or greater than the other.

import java.util.Scanner;

public class NumberComparison {

public static void main(String[] args) {

// Create Scanner object for input

Scanner scanner = new Scanner(System.in);

// Prompt user for first number

System.out.print("Enter the first number: ");

int num1 = scanner.nextInt();

// Prompt user for second number

System.out.print("Enter the second number: ");

int num2 = scanner.nextInt();

// Compare the two numbers

if (num1 == num2) {

System.out.println("Both numbers are equal.");

} else if (num1 > num2) {

System.out.println("The first number is greater than the second number.");

} else {

System.out.println("The first number is less than the second number.");

}

// Close the scanner

scanner.close();

}

}

5. An electricity board charges the following rates for the use of electricity: For the first 200 units: 80 per unit

For the next 100 units: 90per unit Beyond 300 units: Rs.1.00 per unit

All users are charged a minimum of Rs. 100 as meter charge. If the total amount is more than Rs.400, then an additional surcharge of 15% of total amount is

charged. Write a Java program to read the name of user and number of units consumed and print out the charges with names.

import java.util.Scanner;

public class ElectricityBillCalculator {

public static void main(String[] args) {

// Create a Scanner object for reading input

Scanner scanner = new Scanner(System.in);

// Prompt the user to enter their name and number of units consumed

System.out.print("Enter your name: ");

String name = scanner.nextLine();

System.out.print("Enter the number of units consumed: ");

int units = scanner.nextInt();

// Initialize variables for charges

double totalCharges = 0;

double meterCharge = 100;

// Calculate charges based on units consumed

if (units <= 200) {

totalCharges = units \* 0.80;

} else if (units <= 300) {

totalCharges = (200 \* 0.80) + ((units - 200) \* 0.90);

} else {

totalCharges = (200 \* 0.80) + (100 \* 0.90) + ((units - 300) \* 1.00);

}

// Add meter charge

totalCharges += meterCharge;

// Add surcharge if total amount exceeds Rs. 400

if (totalCharges > 400) {

totalCharges += totalCharges \* 0.15;

}

// Display the results

System.out.println("\nElectricity Bill");

System.out.println("Name: " + name);

System.out.println("Units Consumed: " + units);

System.out.printf("Total Charges: Rs. %.2f\n", totalCharges);

// Close the scanner to prevent resource leaks

scanner.close();

}

}

6. Admission to a professional course is subjects to the following conditions: (a) Marks in Mathematics>=60 (b) Marks in Physics>=50 (c) Marks in Chemistry>=40 (d) Total in all three subjects>=200 or Total in Mathematics and Physics>=150 Given the marks in the three subjects, write a Java program to process the applications to list the eligible candidates.

import java.util.Scanner;

public class AdmissionEligibility {

public static void main(String[] args) {

Scanner scanner = new Scanner(System.in);

// Input marks for Mathematics, Physics, and Chemistry

System.out.print("Enter marks in Mathematics: ");

int math = scanner.nextInt();

System.out.print("Enter marks in Physics: ");

int physics = scanner.nextInt();

System.out.print("Enter marks in Chemistry: ");

int chemistry = scanner.nextInt();

// Calculate total marks

int total = math + physics + chemistry;

int mathPhysicsTotal = math + physics;

// Check eligibility conditions

if (math >= 60 && physics >= 50 && chemistry >= 40 && (total >= 200 || mathPhysicsTotal >= 150)) {

System.out.println("Candidate is eligible for admission.");

} else {

System.out.println("Candidate is not eligible for admission.");

}

// Close the scanner

scanner.close();

}

}

7. Write a Java program to find whether given triangle is scalene or isosceles or

equilateral.

import java.util.Scanner;

public class TriangleType {

public static void main(String[] args) {

Scanner scanner = new Scanner(System.in);

// Input the three sides of the triangle

System.out.print("Enter the first side of the triangle: ");

int side1 = scanner.nextInt();

System.out.print("Enter the second side of the triangle: ");

int side2 = scanner.nextInt();

System.out.print("Enter the third side of the triangle: ");

int side3 = scanner.nextInt();

// Determine the type of triangle

if (side1 == side2 && side2 == side3) {

System.out.println("The triangle is Equilateral.");

} else if (side1 == side2 || side2 == side3 || side1 == side3) {

System.out.println("The triangle is Isosceles.");

} else {

System.out.println("The triangle is Scalene.");

}

// Close the scanner

scanner.close();

}

}

8. Write a Java program to grades of a student if the marks are given between 0 and

100.

import java.util.Scanner;

public class StudentGrades {

public static void main(String[] args) {

Scanner scanner = new Scanner(System.in);

// Input student marks

System.out.print("Enter student marks (0-100): ");

int marks = scanner.nextInt();

// Validate input

if (marks < 0 || marks > 100) {

System.out.println("Invalid marks! Please enter a value between 0 and 100.");

} else {

// Determine grade

char grade;

if (marks >= 90) {

grade = 'A';

} else if (marks >= 80) {

grade = 'B';

} else if (marks >= 70) {

grade = 'C';

} else if (marks >= 60) {

grade = 'D';

} else if (marks >= 50) {

grade = 'E';

} else {

grade = 'F';

}

System.out.println("The student's grade is: " + grade);

}

// Close the scanner

scanner.close();

}

}

9. The Fibonacci sequence is defined by the following rule. The first two values in

the sequence are 1 and 1. Every subsequent value is the sum of the two values preceding it. Write a java program that uses non - recursive function.

import java.util.Scanner;

public class FibonacciNonRecursive {

public static void main(String[] args) {

Scanner scanner = new Scanner(System.in);

// Input the number of terms

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

int n = scanner.nextInt();

// Validate input

if (n <= 0) {

System.out.println("Please enter a positive integer.");

} else {

// Print Fibonacci sequence

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

printFibonacci(n);

}

// Close the scanner

scanner.close();

}

public static void printFibonacci(int n) {

int first = 1, second = 1;

if (n >= 1) System.out.print(first + " ");

if (n >= 2) System.out.print(second + " ");

for (int i = 3; i <= n; i++) {

int next = first + second;

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

first = second;

second = next;

}

System.out.println();

}

}

10. The Fibonacci sequence is defined by the following rule. The first two values in the sequence are 1 and 1. Every subsequent value is the sum of the two values preceding it. Write a java program that uses recursive function.

import java.util.Scanner;

public class FibonacciRecursive {

public static void main(String[] args) {

Scanner scanner = new Scanner(System.in);

// Input the number of terms

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

int n = scanner.nextInt();

// Validate input

if (n <= 0) {

System.out.println("Please enter a positive integer.");

} else {

// Print Fibonacci sequence

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

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

System.out.print(fibonacci(i) + " ");

}

System.out.println();

}

// Close the scanner

scanner.close();

}

public static int fibonacci(int n) {

if (n == 1 || n == 2) {

return 1;

}

return fibonacci(n - 1) + fibonacci(n - 2);

}

}