Course Title: Object - Oriented Programming II LAB

Course Code: CSE 2110

Submitted by	Submitted to
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Problem 1:

Question:

Write a Java program to find the sum of all elements in an integer array.

Objective:

This code prompts the user to enter an array of integers, calculates the sum of the elements in the array, and prints the sum to the console.

Lab Work:

```
import java.util.Scanner;

public class Main {

    public static void main(String[] args) {

        Scanner scanner = new Scanner(System.in);

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

        int n = scanner.nextInt();

        int[] array = new int[n];

        System.out.print("Enter elements: ");

        for (int i = 0; i < n; i++) {

            array[i] = scanner.nextInt();

        }

        int sum = 0;

        for (int i = 0; i < n; i++) {

            sum += array[i];

        }

        System.out.println("Sum of all elements: " + sum);

        scanner.close();

    }

}
```

Output:

```
Enter number of elements: 5
Enter elements: 1 2 3 4 5
Sum of all elements: 15
```

Result analysis:

This program effectively reads an array from user input, calculates the sum of its elements, and prints the result.

Problem 2:

Question:

Write a Java program to check if a given number is even or odd.

Objective:

We can learn how to check if a given number is even or odd using modulus operator.

Lab work:

```
import java.util.Scanner;


public class Main {
    public static void main(String[] args) {
        Scanner scanner = new Scanner(System.in);
        System.out.print("Enter a number: ");
        int number = scanner.nextInt();
        if (number % 2 == 0) {
            System.out.println( "even");
        } else {
            System.out.println( "odd");
        }
        scanner.close();
    }
}
```

Output:

```
Enter a number: 7
odd
```

Result analysis:

This code successfully determines if the inputted number is odd or even.

Problem 3:

Question:

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

Object:

We can learn how to find the largest of three numbers using conditional statements.

Lab work:

```
import java.util.Scanner;
public class Main {
    public static void main(String[] args) {
        Scanner scanner = new Scanner(System.in);
        System.out.print("Enter three numbers: ");
        int num1 = scanner.nextInt();
        int num2 = scanner.nextInt();
        int num3 = scanner.nextInt();
        int largest;
        if (num1 >= num2 && num1 >= num3) {
            largest = num1;
        } else if (num2 >= num1 && num2 >= num3) {
            largest = num2;
        } else {
            largest = num3;
        }
        System.out.println("The largest number is: " + largest);
        scanner.close();
    }
}
```

Output:

```
Enter three numbers: 5 9 3
The largest number is: 9
```

Result analysis:

This program effectively reads three integers from user input, compares them, and prints the largest value.

Problem 4:

Question:

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

Objective:

We learn the algorithm to find out if a year is a leap year or not using if ladder.

Lab work:

```
import java.util.Scanner;


public class  Main{
    public static void main(String[] args) {
        Scanner scanner = new Scanner(System.in);
        System.out.print("Enter a year: ");
        int year = scanner.nextInt();
        boolean isLeapYear = false;
        if (year % 4 == 0) {
            if (year % 100 == 0) {
                if (year % 400 == 0) {
                    isLeapYear = true;
                }
            } else {
                isLeapYear = true;
            }
        }
        if (isLeapYear) {
            System.out.println("leap year");
        } else {
            System.out.println("not a leap year");
        }
scanner.close();
}}
```

Output:

```
Enter a year: 2024
leap year
```

Result analysis:

This code successfully determines if the year in leap year or not.

Problem 5:

Question:

Write a Java program to calculate the factorial of a number.

Objective:

We can calculate the factorial of a number using algorithm in a for loop.

Lab work:

```
import java.util.Scanner;


public class Main {
    public static void main(String[] args) {
        Scanner scanner = new Scanner(System.in);
        System.out.print("Enter a number: ");
        int number = scanner.nextInt();
        long factorial = 1;
        for (int i = 1; i <= number; i++) {
            factorial *= i;
        }
        System.out.println("Factorial : " + factorial);


        scanner.close();
    }
}
```

Output:

```
Enter a number: 5
Factorial : 120
```

Result discussion:

This program successfully calculates the factorial of the number and prints it in the console.

Problem: 6

Question:

Write a Java program to check if a number is prime.

Objective:

We can learn how to calculate simple interest.

Lab work:

```
import java.util.Scanner;


public class Main {
    public static void main(String[] args) {
        Scanner scanner = new Scanner(System.in);
        System.out.print("Enter a number: ");
        int number = scanner.nextInt();


        boolean isPrime = true;
        if (number <= 1) {
            isPrime = false;
        } else {
            for (int i = 2; i <= Math.sqrt(number); i++) {
                if (number % i == 0) {
                    isPrime = false;
                    break; }}}
        if (isPrime) {
            System.out.println(" Prime ");
        } else {
            System.out.println(" not a prime number.");
        }
```

Output:

```
Enter a number: 11
  Prime
```

Result discussion:

This program successfully checks and outputs if a number is prime or not.

Problem 7:

Question:

Write a Java program to find the sum of the digits of a number.

Objective:

We can calculate the sum of the digits of a number using while loop and algorithm.

Lab work:

```
import java.util.Scanner;


public class Main{
    public static void main(String[] args) {
        Scanner scanner = new Scanner(System.in);


        System.out.print("Enter a number: ");
        int number = scanner.nextInt();


        int sum = 0;
        while (number != 0) {
            sum += number % 10;
            number = number / 10;
        }


        System.out.println("Sum of the digits: " + sum);
        scanner.close();
    }
}
```

Output:

```
Enter a number: 1234
Sum of the digits: 10
```

Result discussion:

This program successfully adds the sum of the digits of a number and prints it to the console.

Problem 8:

Question:

Write a Java program to print the multiplication table of a given number

Objective:

We can find out the multiplication table of a number using for loop.

Lab work:

```
import java.util.Scanner;


public class Main{
    public static void main(String[] args) {
        Scanner scanner = new Scanner(System.in);


        System.out.print("Enter a number: ");
        int number = scanner.nextInt();


        System.out.println("Multiplication table of " + number + ":");
        for (int i = 1; i <= 10; i++) {
            System.out.println(number + " x " + i + " = " + (number * i));
        }
        scanner.close();
    }
}
```

Output:

```
Enter a number: 3
Multiplication table of 3:
3 x 1 = 3
3 x 2 = 6
3 x 3 = 9
3 x 4 = 12
3 x 5 = 15
3 x 6 = 18
3 x 7 = 21
3 x 8 = 24
3 x 9 = 27
3 x 10 = 30
```

Result discussion:

The code successfully prints the multiplication table in a plausible manner.

Problem 9:

Question:

Write a Java program to count the number of vowels in a given string.

Objective:

This code uses iteration and conditional statement to count the number of vowels in a string.

Lab work:

```
import java.util.Scanner;


public class Main {
    public static void main(String[] args) {
        Scanner scanner = new Scanner(System.in);


        System.out.print("Enter a string: ");
        String input = scanner.nextLine();


        input = input.toLowerCase();


        int vowelCount = 0;
        for (int i = 0; i < input.length(); i++) {
            char ch = input.charAt(i);
            if (ch == 'a' || ch == 'e' || ch == 'i' || ch == 'o' || ch == 'u') {
                vowelCount++;
            }
        }
        System.out.println("Number of vowels : " + vowelCount);
        scanner.close();
    }
}
```

Output:

```
Enter a string: Hello World
Number of vowels : 3
```

Result discussion:

This program successfully prints the number of vowels in a sentence. It uses a function to convert the given sentence to lower case to help the algorithm.

Problem 10:

Question:

Write a Java program to perform basic calculations (addition, subtraction, multiplication, division) based on user input.

Objective:

We can learn about the conditional statement switch case through this code.

Lab work:

```
import java.util.Scanner;
public class Main {
    public static void main(String[] args) {
        Scanner scanner = new Scanner(System.in);

        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 an operation (+, -, *, /): ");
        char operation = scanner.next().charAt(0);

        double result;

        switch (operation) {
            case '+':
                result = num1 + num2;
                System.out.println("Result: " + num1 + " + " + num2 + " = " + result);
                break;
```

```
case '-':
            result = num1 - num2;
            System.out.println("Result: " + num1 + " - " + num2 + " = " + result);
            break;
        case '*':
            result = num1 * num2;
            System.out.println("Result: " + num1 + " * " + num2 + " = " + result);
            break;
        case '/':
            if (num2 != 0) {
                result = num1 / num2;
                System.out.println("Result: " + num1 + " / " + num2 + " = " + result);
            } else {
                System.out.println("Error: Division by zero is not allowed.");
            }
            break;
        default:
            System.out.println("Error: Invalid operation.");
            break;
    }

    scanner.close();
  }
}
```

Output:

```
Enter the first number: 8
Enter the second number: 5
Enter an operation (+, -, *, /): *
Result: 8.0 * 5.0 = 40.0
```

Result discussion:

This code successfully takes inputs and performs arithmetic operations and prints it to the console.