Experiment Number : 07 **Date:**

METHOD OVERLOADING AND METHOD OVERRIDING

Aim:

To understand and implement method overloading and method overriding.

PRE LAB EXERCISE

QUESTIONS

✓ **What is method overloading?**

Defining multiple methods with the same name but different parameters in the same class**.**

✓ **What is method overriding?**

Redefining a parent class method in a child class with the same signature.

✓ **Difference between overloading and overriding.**

Overloading is compile-time polymorphism with different parameters, while overriding is runtime polymorphism with the same method signature in inheritance.

IN LAB EXERCISE

Objective:

To demonstrate compile-time and runtime polymorphism.

PROGRAMS:

1.Student Result System (Method Overriding)

Description:

- Base class Student has method displayResult().
- Subclasses UGStudent and PGStudent override the method to show different grading systems.

Code :

```
import java.util.Scanner;
```

```
// Base class
class Student {
    String name;

    void displayResult() {
        System.out.println("Student Result");
    }
}

// UG Student subclass
class UGStudent extends Student {
    int marks;

    UGStudent(String n, int m) {
        name = n;
        marks = m;
    }

    @Override
    void displayResult() {
        double percentage = (marks / 100.0) * 100;
        System.out.println("UG Student: " + name);
        System.out.println("Marks: " + marks);
        System.out.println("Percentage: " + percentage + "%");
    }
}

// PG Student subclass
class PGStudent extends Student {
    double gpa;
    PGStudent(String n, double g) {
        name = n;
        gpa = g;
    }

    @Override
    void displayResult() {
        System.out.println("PG Student: " + name);
        System.out.println("GPA: " + gpa + " / 10");
    }
}

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

        // Input for UG student
        System.out.print("Enter UG Student Name: ");
        String ugName = sc.nextLine();
        System.out.print("Enter UG Student Marks (out of 100): ");
        int ugMarks = sc.nextInt();
        sc.nextLine(); // consume newline

        // Input for PG student
        System.out.print("Enter PG Student Name: ");
        String pgName = sc.nextLine();
        System.out.print("Enter PG Student GPA (0-10): ");
        double pgGpa = sc.nextDouble();

        // Create objects
        Student s1 = new UGStudent(ugName, ugMarks);
        Student s2 = new PGStudent(pgName, pgGpa);

        System.out.println("\n--- Student Results ---");
        s1.displayResult();
        System.out.println();
        s2.displayResult();

        sc.close();
    }
}
```

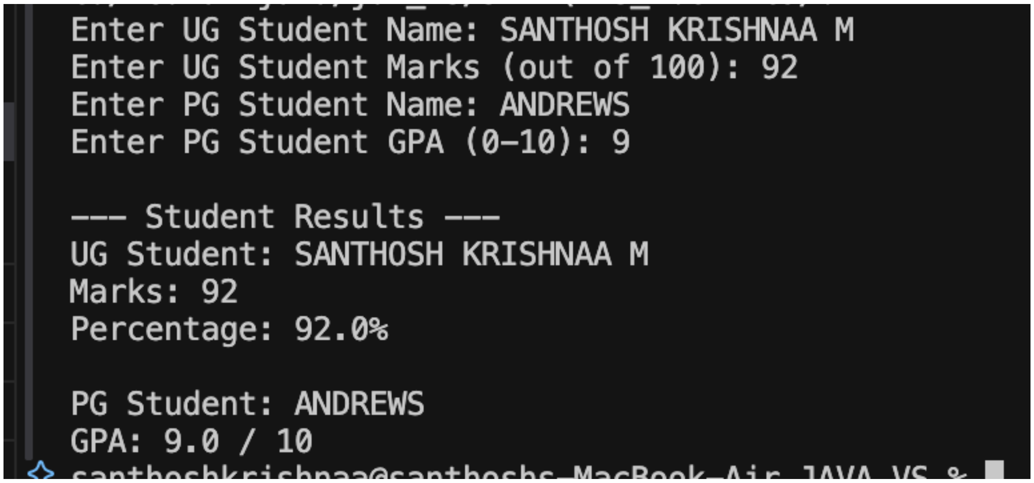
OUTPUT:

Sample Input:

```
Enter UG Student Name: Ram
Enter UG Student Marks (out of 100): 85
Enter PG Student Name: Ravi
Enter PG Student GPA (0-10): 9.2
```

Output:

```
--- Student Results ---
UG Student: Ram
Marks: 85
Percentage: 85.0%
PG Student: Ravi
GPA: 9.2 / 10
```



```
Enter UG Student Name: SANTHOSH KRISHNAA M
Enter UG Student Marks (out of 100): 92
Enter PG Student Name: ANDREWS
Enter PG Student GPA (0-10): 9

--- Student Results ---
UG Student: SANTHOSH KRISHNAA M
Marks: 92
Percentage: 92.0%

PG Student: ANDREWS
GPA: 9.0 / 10
santhoshkrishnaa@santhoshs-MacBook-Air JAVA VS %
```

2. Calculator Program (Method Overloading)

Description:
Create a Calculator class with multiple add() methods to calculate:

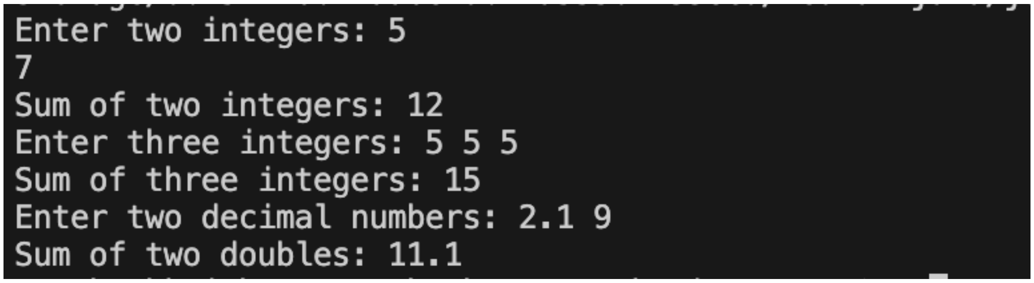
- Addition of 2 integers
- Addition of 3 integers
- Addition of 2 double numbers

Code:

```
import java.util.Scanner;
class Calculator {
    int add(int a, int b) {
        return a + b;
    }

    int add(int a, int b, int c) {
        return a + b + c;
    }

    double add(double a, double b) {
        return a + b;
    }
}
```

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

        System.out.print("Enter two integers: ");
        int x = sc.nextInt();
        int y = sc.nextInt();
        System.out.println("Sum of two integers: " + calc.add(x, y));

        System.out.print("Enter three integers: ");
        int p = sc.nextInt();
        int q = sc.nextInt();
        int r = sc.nextInt();
        System.out.println("Sum of three integers: " + calc.add(p, q, r));

        System.out.print("Enter two decimal numbers: ");
        double a = sc.nextDouble();
        double b = sc.nextDouble();
        System.out.println("Sum of two doubles: " + calc.add(a, b));

        sc.close();
    }
}
```

Output:



```
Enter two integers: 5
7
Sum of two integers: 12
Enter three integers: 5 5 5
Sum of three integers: 15
Enter two decimal numbers: 2.1 9
Sum of two doubles: 11.1
```

Sample Input:

```
Enter two integers: 10 20
Enter three integers: 5 10 15
Enter two decimal numbers: 2.5 3.5
```

Output:

```
Sum of two integers: 30
Sum of three integers: 30
Sum of two doubles: 6.0
```

POST LAB EXERCISE

- ✓ **Is return type important in method overloading and method overriding?**

  Yes, return type is not important in overloading but must be same or covariant in overriding

- ✓ **Can you overload a method by changing only the return type?**

  No, a method cannot be overloaded by changing only the return type**.**

- ✓ **Can static methods be overridden? Can they be overloaded?**

  Static methods cannot be overridden but can be overloaded**.**

- ✓ **Can a method be overridden if the parameter list is different?**

  No, a method cannot be overridden if the parameter list is different**.**

Result:

Thus the method overloading and overriding concepts were implemented and executed successfully.

ASSESSMENT

Description	Max Marks	Marks Awarded
Pre Lab Exercise	**5**	
In Lab Exercise	**10**	
Post Lab Exercise	**5**	
Viva	**10**	
Total	**30**	
Faculty Signature		