OOP LAB

Week 2

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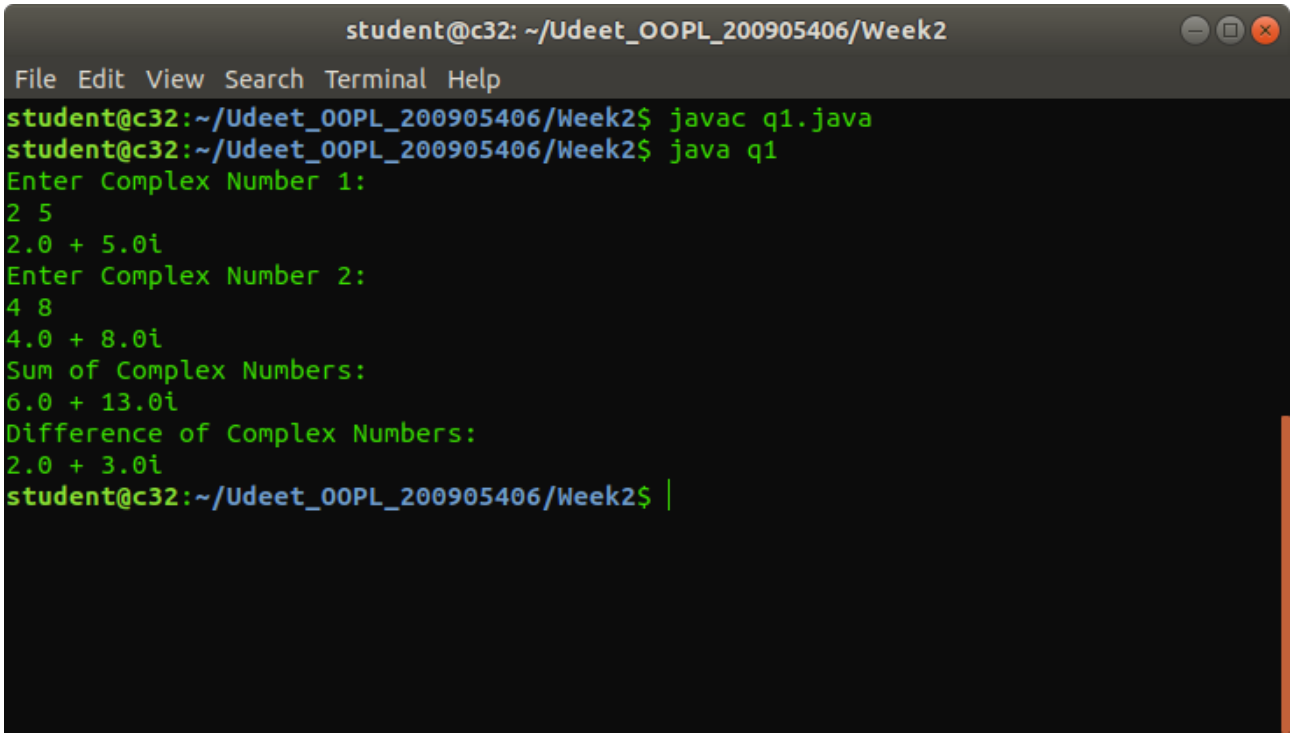
CSE C3

Roll Number 64

1. Define a class to represent a complex number called Complex. Provide the following methods and write a main method to test the class.:
    1. To assign initial values to the Complex object.
    2. To display a complex number in a+ib format.
    3. To add 2 complex numbers. (the return type should be Complex)
    4. To subtract 2 complex numbers

```
import java.util.*;

class Complex
{
	double x, y;
	Complex(double x, double y)
	{
		this.x = x;
		this.y = y;
	}

	void display()
	{
		System.out.println(x+" + "+y+"i");
	}

	Complex add(Complex ob1, Complex ob2)
	{
		Complex ob3 = new Complex(0.0, 0.0);
		ob3.x = ob1.x + ob2.x;
		ob3.y = ob1.y + ob2.y;
		return ob3;
	}

	Complex subtract(Complex ob1, Complex ob2)
	{
		Complex ob3 = new Complex(0.0, 0.0);
		ob3.x = Math.abs(ob1.x - ob2.x);
		ob3.y = Math.abs(ob1.y - ob2.y);
		return ob3;
```

```
	}
}
class q1
{
	public static void main(String[] args) {
		Scanner sc = new Scanner(System.in);
		double a1, b1, a2, b2;
		System.out.println("Enter Complex Number 1:");
		a1 = sc.nextDouble();
		b1 = sc.nextDouble();
		Complex c1 = new Complex(a1, b1);
		c1.display();
		System.out.println("Enter Complex Number 2:");
		a2 = sc.nextDouble();
		b2 = sc.nextDouble();
		Complex c2 = new Complex(a2, b2);
		c2.display();
		Complex c3 = new Complex(0.0, 0.0);
		c3 = c3.add(c1, c2);
		System.out.println("Sum of Complex Numbers: ");
		c3.display();
		Complex c4 = new Complex(0.0, 0.0);
		c4 = c4.subtract(c1, c2);
		System.out.println("Difference of Complex Numbers: ");
		c4.display();
	}
}
```



2.Create a class called Time that has instance variables to represent hours, minutes and seconds. Provide the following methods and write a main method to test the class.:

1. To assign initial values to the Time object.
2. To display a Time object in the form of hh:mm:ss {24 hours format}
3. To add 2 Time objects (the return type should be a Time)
4. To subtract 2 Time objects (the return type should be a Time)
5. To compare 2 Time objects and to determine if they are equal or if the first is greater or smaller than the second one.

```
import java.util.*;

class Time
{
	int h, m, s;
	Time(int h, int m, int s)
	{
		this.h = h;
		this.m = m;
		this.s = s;
	}

	void display()
	{
		String hh = "" + h, mm = "" + m, ss = "" + s;
		if(h<10)
			hh = "0" + h;
		if(m<10)
			mm = "0" + m;
		if(s<10)
			ss = "0" + s;
		System.out.println(hh + ":" + mm + ":" + ss);
	}

	Time add(Time ob1, Time ob2)
	{
		Time ob3 = new Time(0, 0, 0);
		ob3.h = ob1.h + ob2.h;
		ob3.m = ob1.m + ob2.m;
		ob3.s = ob1.s + ob2.s;

		if(ob3.s > 59){
```

```
                ob3.m += ob3.s/60;
                ob3.s = ob3.s - 60;
            }
            if(ob3.m > 59){
                ob3.h += ob3.m/60;
                ob3.m = ob3.m - 60;
            }
            return ob3;
        }

        Time subtract(Time ob1, Time ob2)
        {
            Time ob3 = new Time(0, 0, 0);
            int seconds1 = ob1.h*60*60 + ob1.m*60 + ob1.s;
            int seconds2 = ob2.h*60*60 + ob2.m*60 + ob2.s;
            int diffseconds = Math.abs(seconds1 - seconds2);
            ob3.h = diffseconds / 3600;
            diffseconds = diffseconds % 3600;
            ob3.m = diffseconds / 60;
            diffseconds = diffseconds %60;
            ob3.s = diffseconds;
            return ob3;
        }

        void compare(Time ob1, Time ob2)
        {
            int seconds1 = ob1.h*60*60 + ob1.m*60 + ob1.s;
            int seconds2 = ob2.h*60*60 + ob2.m*60 + ob2.s;
            int diffseconds = seconds1 - seconds2;
            if(diffseconds<0)
                System.out.println("Time 2 is greater");
            else if(diffseconds > 0)
                System.out.println("Time 1 is greater");
            else
                System.out.println("Both Time objects are equal");
        }
}
class q2
{
        public static void main(String[] args) {
```

```
        Scanner sc = new Scanner(System.in);
        int h1, h2, m1, m2, s1, s2;
        System.out.println("Enter Time 1: ");
        h1 = sc.nextInt();
        m1 = sc.nextInt();
        s1 = sc.nextInt();
        Time t1 = new Time(h1, m1, s1);
        t1.display();
        System.out.println("Enter Time 2: ");
        h2 = sc.nextInt();
        m2 = sc.nextInt();
        s2 = sc.nextInt();
        Time t2 = new Time(h2, m2, s2);
        t2.display();
        Time t3 = new Time(0, 0, 0);
        t3 = t3.add(t1, t2);
        System.out.println("Sum of Time: ");
        t3.display();
        Time t4 = new Time(0, 0, 0);
        t4 = t4.subtract(t1, t2);
        System.out.println("Difference of Time: ");
        t4.display();
        t1.compare(t1, t2);
    }
}
```

3. Consider the already defined Complex class. Provide a default constructor and parameterized constructor to this class. Also provide a display method. Illustrate all the constructors as well as the display method by defining Complex objects.

```
import java.util.*;

class Complex
{
	double x, y;

	Complex(){
		this.x = 0;
		this.y = 0;
	}

	Complex(double x, double y)
	{
		this.x = x;
		this.y = y;
	}

	void display()
	{
		System.out.println(x + " + " + y + "i");
	}
```

```
	Complex add(Complex ob1, Complex ob2)
	{
		Complex ob3 = new Complex();
		ob3.x = ob1.x + ob2.x;
		ob3.y = ob1.y + ob2.y;
		return ob3;
	}

	Complex subtract(Complex ob1, Complex ob2)
	{
		Complex ob3 = new Complex();
		ob3.x = Math.abs(ob1.x - ob2.x);
		ob3.y = Math.abs(ob1.y - ob2.y);
		return ob3;
	}
}
class q3
{
	public static void main(String[] args) {
		Scanner sc = new Scanner(System.in);
		double a1, b1, a2, b2;
		System.out.println("Enter Complex Number 1:");
		a1 = sc.nextDouble();
		b1 = sc.nextDouble();
		Complex c1 = new Complex(a1, b1);
		c1.display();
		System.out.println("Enter Complex Number 2");
		a2 = sc.nextDouble();
		b2 = sc.nextDouble();
		Complex c2 = new Complex(a2, b2);
		c2.display();
		Complex c3 = new Complex();
		c3 = c3.add(c1, c2);
		System.out.println("Sum of Numbers: ");
		c3.display();
		Complex c4 = new Complex();
		c4 = c4.subtract(c1, c2);
		System.out.println("Difference: ");
		c4.display();
	}
}
```

4. Create a class called Counter that contains a static data member to count the number of Counter objects being created. Also define a static member function called showCount() which displays the number of objects created at any given point of time. Illustrate this.

```
import java.util.*;

class Counter
{
	static int count = 0;
	Counter()
	{
		count++;
	}

	static void showCount(){
		System.out.println("Current Count: " + count);
	}
}
class q4
{
	public static void main(String[] args) {
		Counter o1 = new Counter();
		Counter o2 = new Counter();
		Counter.showCount();
		Counter o3 = new Counter();
		Counter.showCount();
		Counter o4 = new Counter();
		Counter o5 = new Counter();
```

```
                Counter.showCount();
        }
}
```