Assignment No :- 1

Program Code :
```java
class Complex
{
    int real, imaginary;
    public Complex(int r, int i)
    {
        this.real = r;
        this.imaginary = i;
    }
    public void show()
    {
        System.out.print(this.real + " +i" + this.imaginary);
    }
    public static Complex add(Complex n1,Complex n2)
    {
        Complex res = new Complex(0, 0);
        res.real = n1.real + n2.real;
        res.imaginary = n1.imaginary + n2.imaginary;
        return res;
    }
    public static void main(String arg[])
    {
        Complex c1 = new Complex(4, 5);
        Complex c2 = new Complex(10, 5);

        System.out.print("first Complex number: ");
        c1.show();
        System.out.print("\nSecond Complex number: ");
        c2.show();

        Complex res = add(c1, c2);
        System.out.println("\nAddition is :");
        res.show();
    }
}
```

Output :

```
(base) os@os-Vostro-3268:~/Documents/Sanika$ javac Complex.java
(base) os@os-Vostro-3268:~/Documents/Sanika$ java Complex
first Complex number: 4 +r5
Second Complex number: 10 +r5
Addition is :
14 +r10
```

Assignment No :- 2

Program Code :
```java
import java.util.*;
class Publication
{
        String title;
        int copies,price;
        void saleCopy()
        {}
}
class Book
{
        String title,author;
        int copies,price;
        void saleCopy()
        {
                price=250;
                System.out.println("Total sale :"+copies*price);
        }
        void orderCopies()
        {
                Scanner sc = new Scanner(System.in);
                System.out.println("Enter No. of copies ");
                copies=sc.nextInt();
        }
}
class Magazine
{
        String title;
        int copies,price;
        void saleCopy()
        {}
        void orderQty()
        {}
        void currentIssue()
        {}
        void receiveIssue()
        {}
}
public class P
{
        public static void main(String args[])
        {
                Book b = new Book();
                b.orderCopies();
                b.saleCopy();
        }
}
```

Output :

```
(base) os@os-Vostro-3268:~/Documents/Sanika$ javac P.java
(base) os@os-Vostro-3268:~/Documents/Sanika$ java P
Enter No. of copies
3
Total sale :750
```

Assignment No :- 3

Program Code :

```java
class Employee
{
        String name,add,mail;
        float id,mobile,basic;
        void salary()
        {
                float da,hra,pf,cf,gross;
                da=basic*97/100;
                hra=basic*10/100;
                pf=basic*12/100;
                cf=basic*0.1f/100;
                gross=basic+da+hra-pf-cf;
                System.out.println("Name :"+name);
                System.out.println("Basic Salary :"+basic);
                System.out.println("Gross Salary :"+gross);
        }
}
class Programmer extends Employee
{
        Programmer(String name,int sal)
        {
                this.name=name;
                basic=sal;
        }
}
class Assistant_Proffesor extends Employee
{
        Assistant_Proffesor(String name,int sal)
        {
                this.name=name;
                basic=sal;
        }
}
class Associate_Proffesor extends Employee
{
        Associate_Proffesor(String name,int sal)
        {
                this.name=name;
                basic=sal;
        }
}
class Proffesor extends Employee
{
        Proffesor(String name,int sal)
        {
                this.name=name;
                basic=sal;
        }
}
```

```
}
public class Inheritance
{
        public static void main(String args[])
        {
                Assistant_Proffesor ast = new Assistant_Proffesor("Sanika",45000);
                ast.salary();
                Associate_Proffesor aso = new Associate_Proffesor("Sanu",20000);
                aso.salary();
                Proffesor po = new Proffesor("Sanav",50000);
                po.salary();
                Programmer pm = new Programmer("Sakshi",60000);
                pm.salary();
        }
}
```

Output :


```
(base) os@os-Vostro-3268:~/Documents/Sanika$ javac Inheritance.java
(base) os@os-Vostro-3268:~/Documents/Sanika$ java Inheritance
Name :Sanika
Basic Salary :45000.0
Gross Salary :87705.0
Name :Sanu
Basic Salary :20000.0
Gross Salary :38980.0
Name :Sanav
Basic Salary :50000.0
Gross Salary :97450.0
Name :Sakshi
Basic Salary :60000.0
Gross Salary :116940.0
```

Assignment No :- 4

Program Code :

```java
import java.util.*;
abstract class Shape
{
        double val1,val2;
        void input()
        {
                Scanner sc = new Scanner(System.in);
                System.out.println("Enter first value :");
                val1=sc.nextDouble();
                System.out.println("Enter second value :");
                val2=sc.nextDouble();
        }
        abstract void compute_area();
}
class Triangle extends Shape
{
        void compute_area()
        {
                double area;
                area = 1.0f/2.0f * val1 * val2;
                System.out.println("Triangle area :"+area);
        }
}
class Rectangle extends Shape
{
        void compute_area()
        {
                double area;
                area = val1 * val2;
                System.out.println("Rectangle area :"+area);
        }
}
class Dynamic
{
        public static void main(String args[])
        {
                Shape s;
                Triangle t = new Triangle();
                Rectangle r = new Rectangle();
                s=t;
                s.input();
                s.compute_area();
                s=r;
                s.input();
                s.compute_area();
        }
}
```

Output :

```
(base) os@os-Vostro-3268:~/Documents/Sanika$ javac Assignment4th.java
(base) os@os-Vostro-3268:~/Documents/Sanika$ java Dynamic
Enter first value :
10.5
Enter second value :
5.1
Triangle area :26.775
Enter first value :
2.5
Enter second value :
3.1
Rectangle area :7.75
```

Assignment No :- 5

Program Code :

```java
import java.util.*;
interface Vehicle
{
        void changeGear(int a);
        void speedUp(int a);
        void applyBreaks(int a);
}
class Bicycle implements Vehicle
{
        int speed;
        int gear;
        public void changeGear(int newGear)
        {
                gear = newGear;
        }
        public void speedUp(int increment)
        {
                speed=speed+increment;
        }
        public void applyBreaks(int decrement)
        {
                speed=speed-decrement;
        }
        public void printStates()
        {
                System.out.println("Speed = "+speed+"gear = "+gear);
        }
}
class Bike implements Vehicle
{
        int speed;
        int gear;
        public void changeGear(int newGear)
        {
                gear = newGear;
        }
        public void speedUp(int increment)
        {
                speed=speed+increment;
        }
        public void applyBreaks(int decrement)
        {
                speed=speed-decrement;
        }
        public void printStates()
        {
                System.out.println("Speed = "+speed+"gear = "+gear);
        }
}
```

```java
class StartVehicle
{
        public static void main(String args[])
        {
                Bicycle bicycle = new Bicycle();
                bicycle.changeGear(2);
                bicycle.speedUp(3);
                bicycle.applyBreaks(1);
                System.out.println("Bicycle present state :");
                bicycle.printStates();

                Bike bike = new Bike();
                bike.changeGear(1);
                bike.speedUp(4);
                bike.applyBreaks(3);
                bike.applyBreaks(1);
                System.out.println("Bike present state :");
                bike.printStates();
        }
}
```

Output :

Assignment No :- 6

Program Code :
```java
import java.util.*;
public class Exceptions
{
        public static void main(String args[])
        {
                int num1,num2,result;
                Scanner sc = new Scanner(System.in);
                try{
                System.out.println("Enter first number :");
                num1=Integer.parseInt(sc.next());
                System.out.println("Enter second number :");
                num2=Integer.parseInt(sc.next());
                result=num1/num2;
                System.out.println("Division :"+result);
                int x[]=new int[12];
                x[15]=10;
                System.out.println("x[15]= "+x[15]);
                }
                catch(ArithmeticException e)
                {
                        System.out.println("Denominator is zero :"+e);
                }
                catch(NumberFormatException e)
                {
                        System.out.println("Inpurt is wrong :"+e);
                }
                catch(ArrayIndexOutOfBoundsException e)
                {
                        System.out.println("Wrong input number :"+e);
                }
        }
}
```

Output :

```
(base) os@os-Vostro-3268:~/Documents/Sanika$ javac Exceptions.java
(base) os@os-Vostro-3268:~/Documents/Sanika$ java Exceptions
Enter first number :
10
Enter second number :
0
Denominator is zero :java.lang.ArithmeticException: / by zero
(base) os@os-Vostro-3268:~/Documents/Sanika$ java Exceptions
Enter first number :
2.4
Inpurt is wrong :java.lang.NumberFormatException: For input string: "2.4"
(base) os@os-Vostro-3268:~/Documents/Sanika$ java Exceptions
Enter first number :
10
Enter second number :
5
Division :2
Wrong input number :java.lang.ArrayIndexOutOfBoundsException: Index 15 out of bounds for length 12
```