1. Create a class called Person with attributes such as name and age. Derive a class called Student from Person that adds an attribute studentId. Write a program to
demonstrate single inheritance by creating objects of both classes and displaying their attributes.

```
package jeevan;

public class Person {

            protected String name;
            protected int age;
            public Person(String name, int age)
            {
                  this.name=name;
                  this.age=age;
            }
            public void display() {
              System.out.println("Name: " + name);
              System.out.println("Age: " + age);
            }
      }
```

```
package jeevan;

public class Student extends Person {
    private String studentId;
      public Student(String name, int age, String studentId) {
      super(name, age);
      this.studentId = studentId;
          }
      public void display() {
      super.display();
              System.out.println("Student ID: " + studentId);
          }
            public static void main(String[] args) {
                  Person p = new  Student("jeevan", 23, "AF0311942");
                  p.display();

            }

}
```

OUTPUT:
Name: jeevan
Age: 23
Student ID: AF0311942

2. Design a class called Shape with methods to calculate the area and perimeter. Derive classes like Circle, Rectangle, and Triangle from Shape.
Write a program to create objects of these classes and compute their areas and perimeters.

```
package jeevan;

public abstract class Shape {

            abstract double Area();
      abstract double Perimeter();
      }

package jeevan;

public class Circle extends Shape{
      private double radius;
      public Circle(double radius)
      {
            this.radius=radius;
      }
      double Area() {
            return Math.PI*radius*radius;
      }
      double Perimeter() {
            return Math.PI*radius;
      }
}


package jeevan;

public class Rectangle extends Shape{
      private double length;
      private double width;

      public Rectangle(double length, double width) {
      this.length = length;
      this.width = width;
          }
            double Area() {
                  return length*width;
            }
            double Perimeter() {

                  return 2*(length*width);
            }

}
package jeevan;

public class Triangle extends Shape{
      private double side1;
      private double side2;
      private double side3;
      public Triangle(double side1, double side2, double side3) {
      this.side1 = side1;
```

```
      this.side2 = side2;
      this.side3 = side3;
          }
            double Area() {
                  double s = (side1 + side2 + side3) / 2; // calculate
semiperimeter
      return Math.sqrt(s * (s - side1) * (s - side2) * (s - side3));
            }


            double Perimeter() {
                  return side1 + side2 + side3;
            }

}

package jeevan;

public class ShapeSimulation {
      public static void main(String[] args) {
            Shape c,r,t;
            c = new Circle(2);
            r = new Rectangle(2, 1.5);
            t = new Triangle(3, 3, 3);
            System.out.println("Area of the Circle = "+c.Area());
            System.out.println("Perimeter of the Circle =
"+c.Perimeter());

      System.out.println("========================================");
            System.out.println("Area of the Rectangle = "+r.Area());
            System.out.println("Perimeter of the Rectangle =
"+r.Perimeter());

      System.out.println("========================================");
            System.out.println("Area of the Triangle = "+t.Area());
            System.out.println("Perimeter of the Triangle =
"+t.Perimeter());
      }




}


OUTPUT:
Area of the Circle = 12.566370614359172
Perimeter of the Circle = 6.283185307179586
========================================
Area of the Rectangle = 3.0
Perimeter of the Rectangle = 6.0
========================================
Area of the Triangle = 3.897114317029974
Perimeter of the Triangle = 9.0
```

3. Create a base class called Animal with a method named sound(), which prints "Animal makes a sound." Derive classes Cat and Dog from Animal. Override the sound() method in each derived class to print "Cat meows" and "Dog barks" respectively. Write a program to demonstrate method overriding by creating objects of the derived classes and calling the sound() method.

```
package jeevan;

public class Animals {

            //Overriding
      public void Sound() {
                  System.out.println("Animal makes a sound.");
            }
      }
```

```
package jeevan;

public class Cat extends Animals {
      public void Sound() {
            System.out.println("Cat meows");
      }
}
```

```
package jeevan;

public class Dog {
      public void Sound() {  //overridding
            System.out.println("Dog barks");
      }
}
```

```
package jeevan;

public class AnimalSimulation {
      public static void main(String[] args) {
        Animals a;
        Cat c;
          Dog d;
            a = new Animals();
            c = new Cat();
            d = new Dog();
            a.Sound();
            c.Sound();
            d.Sound();


}
```

```
}
```

OUTPUT:
Animal makes a sound.
Cat meows
Dog barks

4. Design a class called Shape with a method named calculateArea(). Derive classes such as Circle, Rectangle, and Triangle from Shape and override
the calculateArea() method in each derived class to compute the area specific to that shape. Write a program to create objects of these classes and
invoke the calculateArea() method to calculate and display their respective areas.

```
package jeevan;
abstract class Shape {
            abstract double CaculateArea();
      }

package jeevan;
      public class Circle extends Shape {
            private double  radius;
            public Circle(doubleradius) {
                  this.radius=radius;
            }

            //Overriding
      double Caculate Area() {
                  return Math.PI*radius*radius;
            }
      }

      package jeevan;
      public class Rectangle extends Shape {
            private double length;
      private double width;

      public Rectangle(double length, double width) {
      this.length = length;
      this.width = width;
      }
      //Overriding
            double CaculateArea() {
                  return length*width;
            }
      }

      package jeevan;
      public class Triangle extends Shape {
            private double side1;
      private double side2;
```

```
      private double side3;
      public Triangle(double side1, double side2, double side3) {
      this.side1 = side1;
      this.side2 = side2;
      this.side3 = side3;
      }
      //Overriding
            double Caculate Area() {
                  doubles = (side1 + side2 + side3) / 2; // calculate
semiperimeter
      return Math.sqrt(s * (s - side1) * (s - side2) * (s - side3));
            }
      }

      package jeevan;
      public class ShapeSimulation {
            public static void main(String[] arg) {
                  Shape c,r,t;
                  c = new Circle(2);
                  r = new Rectangle(2, 1.5);
                  t = newT riangle(3, 3, 3);
                  System.out.println("Area of the Rectangle = "+r.Area());
                  System.out.println("Area of the Rectangle = "+r.Area());

                  System.out.println("Area of the Triangle = "+t.Area());
            }
      }



}
Output:
Area of the Circle = 12.566370614359172
Area of the Rectangle = 3.0
Area of the Triangle = 3.897114317029974
```