1. Program 4 Instructions, CS102, Prof. Loftin

You are given a class Pair, which stores a pair of integers. You must write Point, a subclass of Pair, and LabeledPoint, a subclass of Point.

2. Point class

Implement the following public methods:

Point(int xx, int yy)
String toString()
double distance()
double distance(Point p)

- The constructor can just invoke the one for Pair, using super.
- The toString() method should distinguish a Point from a Pair (see the sample output below).
- The first distance() method find the distance from the current Point (represented by this) to the origin; the second returns the distance from the current Point to p.
- The distance between two points \((x_1, y_1)\) and \((x_2, y_2)\) is given by the formula

\[
\sqrt{(x_1 - x_2)^2 + (y_1 - y_2)^2}
\]

In particular, the distance from a point \((x_1, y_1)\) to the origin \((0, 0)\) is given by

\[
\sqrt{x_1^2 + y_1^2}
\]

3. LabeledPoint class

Implement the following public methods:

protected String label; // New instance variable
LabeledPoint(String s, Point p) // set label to s
String toString()

4. Submission

You should submit your Point.java and LabeledPoint.java as email attachments to loftin@rutgers.edu.
public class Pair{
    protected int x, y;
    Pair(int xx, int yy){x=xx;y=yy;}
    public String toString(){
        return "Pair["+x+","+y+"]";
    }
}

public class Main{
    public static void main(String[] args){
        Pair pair=new Pair(1,2);
        System.out.println(pair);
        Point point=new Point(3,4);
        System.out.println(point);
        System.out.println(point.distance());
        Point point2=new Point(-3,5);
        System.out.println(point2);
        System.out.println(point2.distance());
        System.out.println(point.distance(point2));
        System.out.println(point2.distance(point));
        Point origin=new LabeledPoint("Origin",new Point(0,0));
        System.out.println(origin);
        Point p2=new LabeledPoint("Point 2",point2);
        System.out.println(p2);
        System.out.println(p2.distance());
    }
}

8. Output of the driver class

Pair[1,2]
Point[3,4]
5.0
Point[-3,5]
5.830951894845301
6.082762530298219
6.082762530298219
LabeledPoint[Origin,0,0]
LabeledPoint[Point 2,-3,5]
5.830951894845301