

Worksheet: Coordinate Class

Write class `Coordinate` that has:

- Two private fields, `x` and `y`, each of which stores a real number.
- A constructor that takes two parameters to set fields `x` and `y`, respectively.
- A getter for each of the fields.
- An instance method named `distance` that takes in two real number parameters that represent `x` and `y` coordinates, and calculates the distance the `Coordinate` object is from those coordinates.
- Another instance method named `distance` that takes in a `Coordinate` object parameter and calculates the distance “this” `Coordinate` object is from the `Coordinate` object parameter.

Write the class in the space below and on the reverse of this paper, then write a short `TestCoordinate` class that tests the `distance` method of the `Coordinate` class.

```
1 public class Coordinate {
2     final double x;
3     final double y;
4     static final Coordinate origin = new Coordinate(0,0);
5     Coordinate(double x, double y) {
6         this.x = x;
7         this.y = y;
8     }
9     public double distance(double x, double y) {
10        return Math.sqrt(
11            Math.pow(this.x - x, 2) +
12            Math.pow(this.y - y, 2)
13        );
14    }
15    public double distance(Coordinate c) {
16        return distance(c.x, c.y);
17    }
18    public double getX() {
19        return x;
20    }
21    public double getY() {
22        return y;
23    }
24    @Override
25    public String toString() {
26        return "(" + x + "," + y + ")";
27    }
28 }
```

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```
1 public class TestCoordinate {
2     public static void main(String[] args) {
3         Coordinate c = new Coordinate(3, 0);
4         verify(c.distance(0,4), 5.0);
5         Coordinate c1 = new Coordinate(-1,1);
6         Coordinate c2 = new Coordinate(-1,4);
7         verify(c1.distance(c2), 3.0);
8         verify(c1.distance(Coordinate.origin), Math.sqrt(2));
9     }
10    public static void verify(double d1, double d2) {
11        verify(d1, d2, 1e-12);
12    }
13    public static void verify(double d1, double d2, double e){
14        String s = "calculated: " + d1 + "; expected: " + d2;
15        if(Math.abs(d2-d1) < e) {
16            System.out.println("Verified: " + s);
17        } else {
18            System.out.println("*FAILED*: " + s);
19        }
20    }
21 }
```