Lab 1

(a)

We cannot store the objects in *Collection* like **HashSet** if we forget to override hashCode() method. Because **HashSet** is a set, that is to say it does not contain any duplicate elements. If we only override equals(), here comes the problem that when two objects have different hashCodes, they may satisfy the equals() method, which could result in duplication in a Set.

ref

(b)

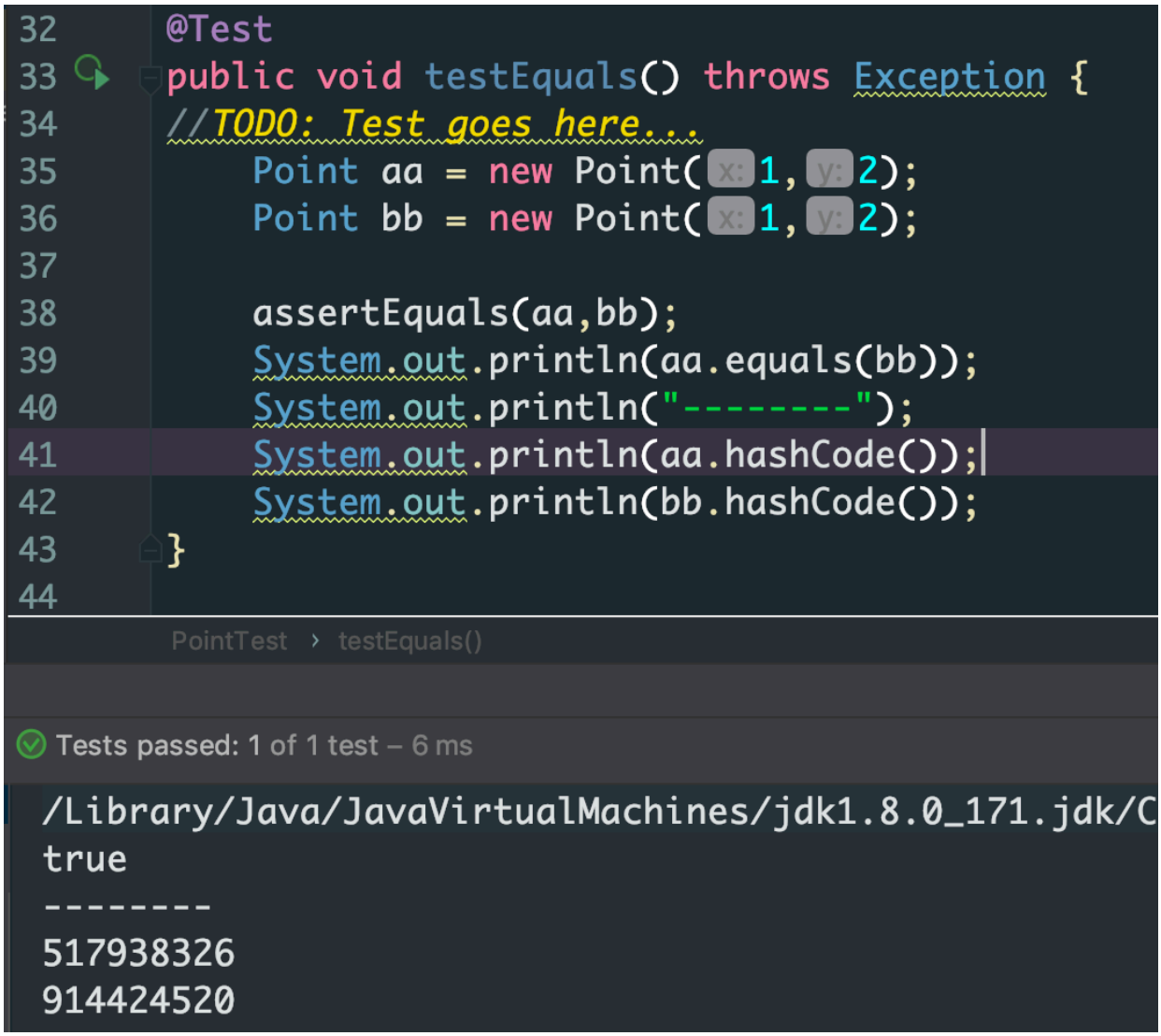
`Objecta; Object b;`

If `a.equals(b)`

Then `a.hashCode() == b.hashCode()`

- If two objs are equal according to their equals() method, they must have the same hash code.
- If two objs have the same hash code, they do not necessarily have to be equal.
- equals() returns `true/false`, and hashCode() returns a code.

(c)



(d)

After we override hashCode(), we can see that `aa` and `bb` has the same hash code.

```java
@Test
public void testEquals() throws Exception {
//TODO: Test goes here...
    Point aa = new Point( x: 1, y: 2);
    Point bb = new Point( x: 1, y: 2);

    assertEquals(aa,bb);
    System.out.println(aa.equals(bb));
    System.out.println("--------");
    System.out.println(aa.hashCode());
    System.out.println(bb.hashCode());
}

```

PointTest › testEquals()

Tests passed: 1 of 1 test – 40 ms

```
/Library/Java/JavaVirtualMachines/jdk1.8.0_171.jdk/C
true
--------
33
33
```

(e)

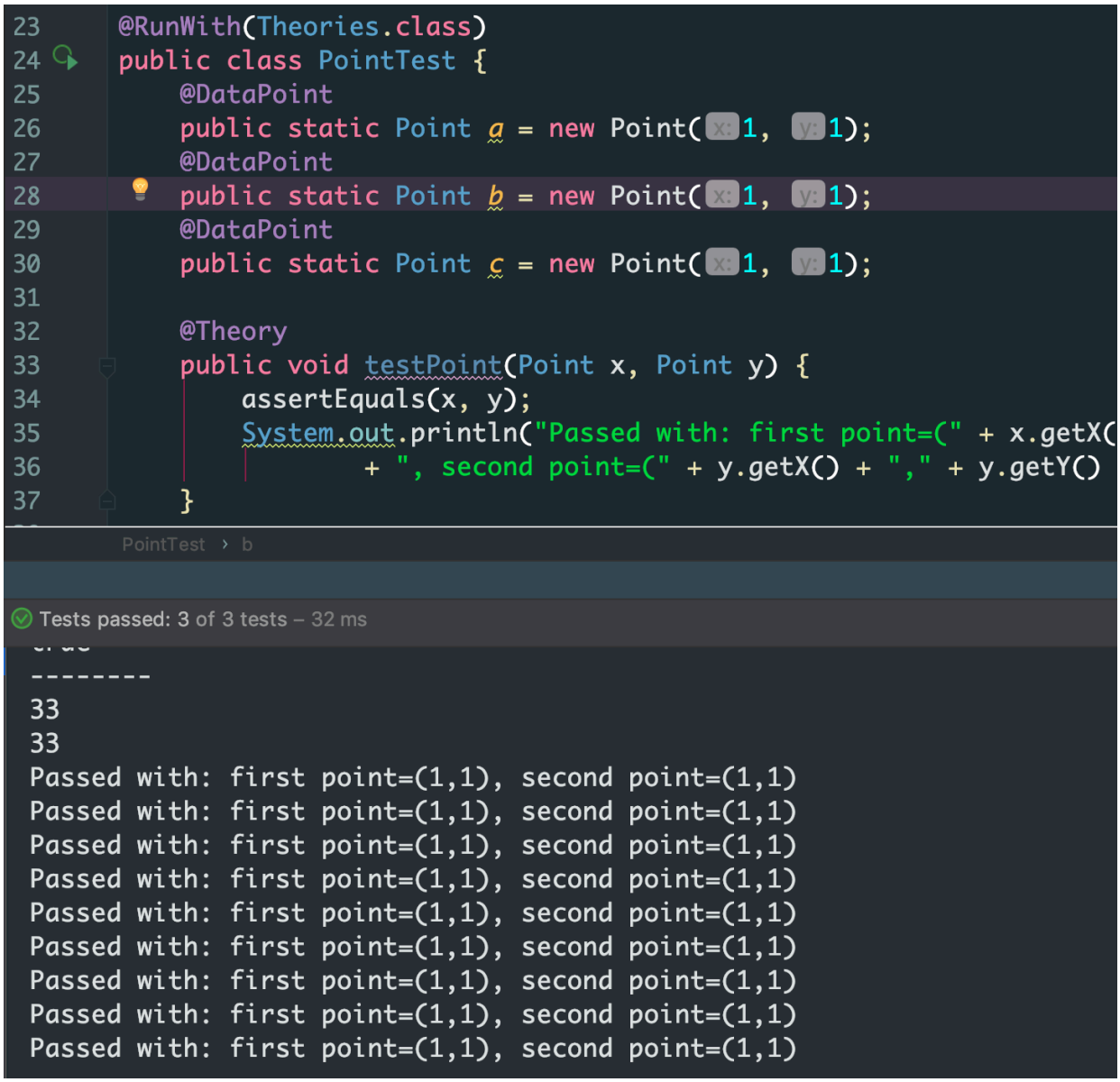
```java
@RunWith(Theories.class)
public class PointTest {
    @DataPoint
    public static Point a = new Point( x: 1, y: 1);
    @DataPoint
    public static Point b = new Point( x: 1, y: 2);
    @DataPoint
    public static Point c = new Point( x: 1, y: 1);

    @Theory
    public void testPoint(Point x, Point y) {
        assertEquals(x, y);
        System.out.println("Passed with: first point=(" + x.getX() + "," + x.getY() + ")"
                + ", second point=(" + y.getX() + "," + y.getY() + ")");
    }

```

PointTest

Tests failed: 1, passed: 2 of 3 tests – 59 ms



We can find out that when using Theory and Datapoint annotations, we try to test if two points are equal. If there exists a point not equal to others, the test will fail and throw exceptions.