2015年度 オブジェクト指向プログラミング 定期試験 問題用紙

```
/* Point.java に保存 */
public interface Point {
  void print();
}

/* PointXY.java に保存 */
public class PointXY implements Point {
  protected int x, y;
  public PointXY(int x, int y) {
    this.x = x; this.y = y;
  }
  public void print() {
    System.out.println("("
            + getPosition() + ")");
  }
  protected String getPosition() {
    return x + ", " + y;
  }
}

/* PointXYZ.java に保存 */
public class PointXYZ extends PointXY
                      implements Point {
  private int z;
  public PointXYZ(int x, int y, int z) {
    super(x, y);  this.z = z;
  }
  protected String getPosition() {
    return super.getPosition() + ", " + z;
  }
}

/* PointRTheta.java に保存 */
public class PointRTheta implements Point {
  private int r, theta;
  public PointRTheta(int r, int theta)
    throws NegativeNumberException {
    if (r < 0) {
      String msg = r + " is negative.";
      throw new NegativeNumberException(msg);
    }
    this.r = r;  this.theta = theta;
  }
  public void print() {
    System.out.println("r=" + r
                + ", theta=" + theta);
                          /* 右欄に続く */
  }
  public int length() {
    return r;
  }
}

/* NegativeNumberException.java に保存 */
public class NegativeNumberException
                    extends Exception {
  public NegativeNumberException() { super(); }
  public NegativeNumberException(String mes) {
    super(mes);
  }
}

/* PrintPoints.java に保存 */
public class PrintPoints {
  public static void main(String[] args) {
    try {
      Point    p1 = new PointXY(5, 5);
      Point    p2 = new PointXYZ(1, 2, -1);
      PointXY  p3 = new PointXYZ(3, 0, 1);
      PointXYZ p3a = p3;
      Point    p3b = p3;
      System.out.print("p1: "); p1.print();
      System.out.print("p2: "); p2.print();
      System.out.print("p3: "); p3.print();

      PointRTheta q1 = new PointRTheta(3, 45);
      Point q2 = q1;
      System.out.print("q1: "); q1.print();
      System.out.println("length = " + q1.length());
      System.out.print("q2: "); q2.print();
      System.out.println("length = " + q2.length());

      Point a = new PointRTheta(2, -30);
      System.out.print("a: "); a.print();
      Point b = new PointRTheta(-1, 60);
      System.out.print("b: "); b.print();
      Point c = new PointRTheta(0, 0);
      System.out.print("c: "); c.print();
    }
    catch (NegativeNumberException e) {
      System.out.println(e.getMessage());
    }
  }
}
```