University of Wisconsin-Stout campus

Programming Assignment No. 3

A. Write your own name and that of your programming partner on the top of this page.

B. Start a new project and package called PA3 and set up your programs inside.

C. YOU MAY NOT CONSULT THE SIs for this project. NOR may you use the Internet, copy code from your classmates or anyone else, nor give away code to your classmates. NOR may you discuss concepts with your classmates. You may choose a programming partner with whom to work on this assignment. The design and coding MUST be done sitting together, and each partner must code half of the project while the other partner observes and checks. (Of course, all you need to do is send code to each other's machines if you use your own machines to code.)

D. I have provided three classes for you to use, User Class, which contains main, a class Shape, and a class IsosTriangle. Using the class IsosTriangle as an example, create three more classes that are subclasses of Shape, a class for squares, a class for circles, and a class for rectangles. Run the program from UserClass and show me your results. Do you understand why you get the output that you get?

E. Your program should print out the following:
- **a. The output for the System.out.println statements in main.**

F. You will need to fully document your work, including the following:
- **a. The names of all authors,**
- **b. The course name and your section(s),**
- **c. The date that the project is due,**
- **d. The title of the project and the purpose of the project,**
- **e. The contract between the user and the program,**
- **f. The purpose of all routines called, including main, and**
- **g. The meaning of all other identifiers.**

G. Your deliverable is a hardcopy of your code by this Thursday, April 21, at 5:00 p.m., along with a hardcopy of one run. Points will be earned for the following:

The program works according to the above requirements – 50 points
The program is fully documented – 20 points
Choice of identifier names is meaningful
Other documentation
Cooperative work skills – 15 points
Program style – 15 points
The code is efficient, yet readable (including line spacing and indentation).
The code makes good use of variables, i.e., are

public class Shape {

```
package P43;

public class UserClass {

    public static void main(String[] args) {

        Circle c1 = new Circle();
        Square s1 = new Square();
        Rectangle r1 = new Rectangle();
        IsosTriangle i1 = new IsosTriangle();

        System.out.println(c1.area(4));
        System.out.println(s1.area(4));
        System.out.println(r1.area(3,4));
        System.out.println(i1.area(3,4));

        System.out.println(c1.corners);
        System.out.println(s1.corners);
        System.out.println(r1.corners);
        System.out.println(i1.corners);

        Shape shape1 = c1;
        Shape shape2 = s1;
        Shape shape3 = r1;
        Shape shape4 = i1;

        System.out.println("shape1 is a " + shape1.idShape());
        System.out.println("shape2 is a " + shape2.idShape());
        System.out.println("shape3 is a " + shape3.idShape());
        System.out.println("shape4 is a " + shape4.idShape());
```

```
public class Shape {

      protected int corners;
      protected int sides;

      public double area( ) {
            double x = 0;
            return x;
      }

      public double perimeter( ) {
            double x = 0;
            return x;
      }

      public String idShape ( ) {
            String x = null;
            return x;
      }

}
```

```
package PA3;

public class IsosTriangle extends Shape {

      IsosTriangle( ) {
            corners = 3;
            sides = 3;
      }

      public double area( double base, double height ) {
            return (0.5 * base * height);
      }

      public double perimeter( double base, double height ) {
            return (base + (2 * Math.sqrt((height*height) +
(base*base*0.25)));
      }

      public String idShape ( ) {
            String x = "IsosTriangle";
            return x;
      }

}
```