

CS 102: Extra Problem, 9/30/09

1. Consider the following abstract class `Triangle` which encodes triangle (stored by its three side-lengths) and computes the perimeter.

```
public abstract class Triangle{
    protected double s1,s2,s3;
    public Triangle (double x, double y, double z){
        s1 = x;
        s2 = y;
        s3 = z;
    }
    public double perimeter(){
        return s1 + s2 + s3;
    }
    public abstract double area();
}
```

The `area` method will be implemented polymorphically in child classes `RightTriangle` and `EquilateralTriangle`.

A right triangle will be determined by its two sides adjacent to the right angle: the base b and the height h . Then the third side will be determined by the Pythagorean Formula:

$$\sqrt{b^2 + h^2}$$

The area of a right triangle is determined by the formula $\frac{1}{2}bh$.

In an equilateral triangle, all the sides have equal length s , and the area is given by $s^2 \frac{\sqrt{3}}{4}$.

Write the classes `RightTriangle` and `EquilateralTriangle`, both of which will be child classes of `Triangle`. Both should implement the `area()` method correctly. The constructor of `RightTriangle` should accept two `double` parameters representing the base and the height, while the constructor of `EquilateralTriangle` should accept one `double` parameter representing the side length. Your classes should work with the following driver class:

```
public class TriangleDriver{
    public static void main(String[] args){
        Triangle t = new RightTriangle(3,4);
        Triangle u = new EquilateralTriangle(7);
        System.out.println(t.area() + "\n" + t.perimeter()
            + "\n" + u.area()
            + "\n" + u.perimeter());
    }
}
```