

ADVANCE PROGRAMMING (CSE201)

MID SEM EXAM

Monsoon 2022

QUESTION-1: Create a class Earthquake which has 2 attributes: a name (String), and intensity (floating point number). In the Main class, first take in a string and a floating point number as user input (you can assume valid inputs). If the floating point number is NOT in the range 2.0 to 8.0 (both inclusive in the range), then you have to throw a custom (user-defined) exception and handle it suitably. If it's in the range, you have to create an object of the Earthquake class initialized with the values taken as input, and print the object using the System.out.println method such that its attributes get displayed. **(40% Weightage)**

TEST CASE-1:

```
Enter the name: Taurus
Enter the intensity:
3.3
The name of the Earthquake is: Taurus
The intensity of this earthquake is: 3.3
```

TEST CASE-2:

```
Enter the name: Destructor
Enter the intensity:
8.7
Please enter valid intensity values in future
```

QUESTION-2: You will be designing an OOPS based system for shapes and perform basic geometric operations on them. Make sure you use OOPS concepts such as encapsulation, inheritance, polymorphism and more. Consider a two-dimensional cartesian plane, where each point is represented using two coordinates (x, y). We will consider the following types of shapes -

- A circle which has a centre coordinate (x, y) and radius value
- A triangle which has three points representing three vertices
- A quadrilateral which is represented using four points representing four vertices

Each shape has an area and a perimeter associated with it which is calculated differently for each shape (you can take $\pi = 3.14$) -

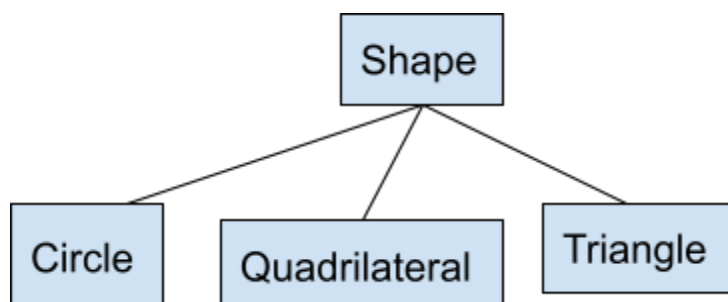
Shape	Perimeter	Area
Circle	$2 \cdot \pi \cdot \text{radius}$	$\pi \cdot \text{radius} \cdot \text{radius}$
Triangle	sum of side lengths	heron's formula
Quadrilateral	sum of side lengths	divide into two triangles and apply heron's formula

Heron's formula \Rightarrow Area of triangle = $\text{sqrt}(s * (s - a) * (s - b) * (s - c))$
where $s = (a + b + c)/2$ and a, b, c represent side lengths of the triangle

Note: you can assume that input points for Triangle and Quadrilateral are always given in clockwise direction (look at the test case)

Note: You are free to use helper functions as you see fit, on top of the mandatory requirements. It is advisable to think of helper functions as they will drastically reduce the complexity of your code.

The class hierarchy can roughly be visualised as follows -



Along with this you also have to implement shape-specific functions as mentioned below -

1. Circle

- boolean checkIntersection(Circle circle): should return true or false depending on whether two circles intersect or not (assume circles just touching to also be intersecting)

2. Triangle

- String getType(): should return the type of triangle as 'equilateral ($a=b=c$)', 'isosceles (two sides equal)' or 'scalene (sides are not equal)'

3. Quadrilateral

- String getType(): should return the type of the quadrilateral as either 'parallelogram' or 'rhombus'

Note: You have to write the code from scratch - you can either take values as input or hard code them. An example for your reference is given below. **(60% Weightage)**

TEST CASE

(you have to create two circles, one triangle and one quadrilateral)

4 // number of elements in shapes array

circle // type of shape

0 0 1 // (x, y, radius) of circle

circle // type of shape

2 0 2 // (x, y, radius) of circle

triangle // type of shape

0 0 0 4 3 0 // (x1, y1, x2, y2, x3, y3) in clockwise order

quadrilateral // type of shape

0 0 1 0 1 1 0 1 // (x1, y1, x2, y2, x3, y3, x4, y4) in clockwise order

<print area and perimeter of circle-2>

12.56 // perimeter of circle-2

12.56 // area of circle-2

<print area and perimeter of triangle>

12 // perimeter of triangle

6 // area of triangle

<print area and perimeter of quadrilateral>

4 // perimeter of quadrilateral

1 // area of quadrilateral

<check intersection of circle-1 and circle-2>

true

<use getType() function to print the type of triangle and quadrilateral>

scalene // for triangle

rhombus // for quadrilateral