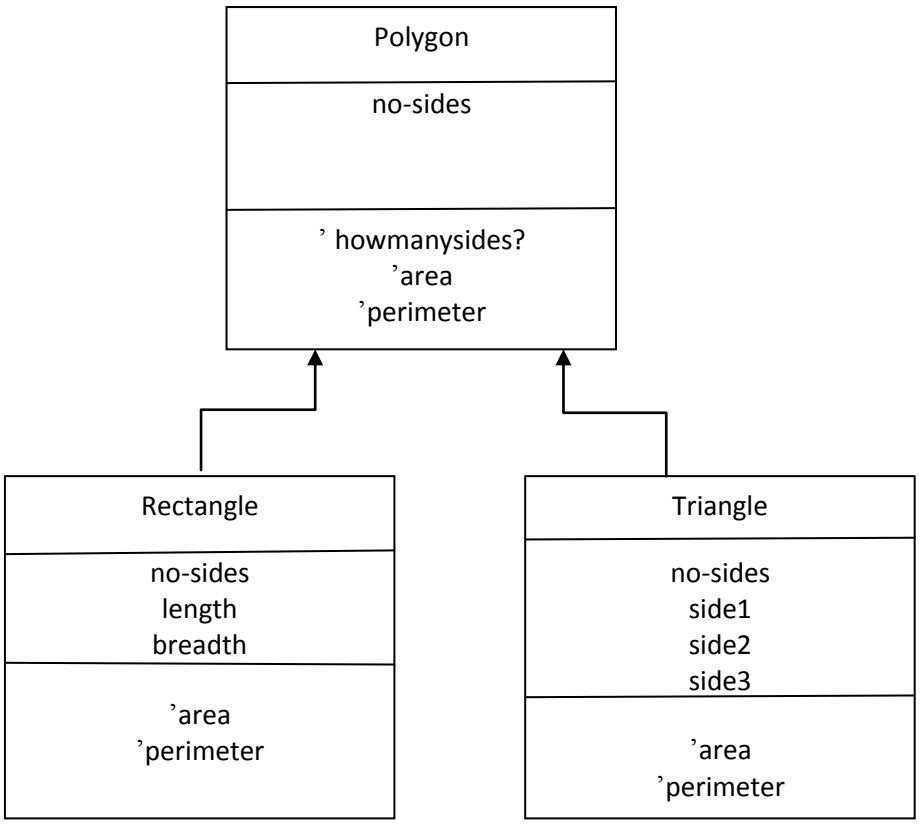
UNIVERSITY OF THE WEST INDIES
Department of Computing
COMP1127–Introduction to Computing II
Lab 05

Object-oriented programming

Your answers to the questions in this lab assignment are to be placed in a single file and uploaded to the appropriate lab submission on OurVLE before the submission activity closes.

Introduction

Consider three classes polygon, rectangle and triangle, where polygon is the superclass and rectangle and triangle are its subclasses.



The data attributes and the methods for the three classes are shown in the class diagram. The polygon class has been implemented for you in lab05.py. The message howmanysides returns the number of sides a particular object may have. Note in the class diagram that howmanysides is being inherited by the subclasses. The messages area and perimeter display a message that no area and perimeter exist for a polygon.

Problem 1

Complete the implementation of the rectangle class which takes three arguments no-sides (number of sides), breadth and length to create a rectangle object. The rectangle class is a subclass of polygon class. Implement messages `area` and `perimeter` for the rectangle class using the formulae given below.

$$area = length \times breadth$$

$$perimeter = (2 \times (length + breadth))$$

Test your implementation using the following expressions;

```
>>> r1=rectangle(2,4)
>>> r1.area()
8
>>> r1.howmanysides()
4
>>> r1.perimeter()
12
>>>
```

Problem2

Complete the implementation of the triangle class which takes four arguments no-sides (number of sides) and the three sides of a triangle a, b and c to create a triangle object. The triangle class is a subclass of polygon class. Implement messages `area` and `perimeter` for the triangle class using the formulae given below.

$$perimeter = \mathrm{a} + \mathrm{b} + \mathrm{c}$$

$$area == \sqrt{s(s-a)(s-b)(s-c)}$$

$$where\ s = \frac{\mathrm{a+b+c}}{2}$$

Test your implementation using the following expressions;

```
>>> t1=triangle(5,5,5)
>>> t1.area()
10.825317547305483
>>> t1.howmanysides()
3
>>> t1.perimeter()
15
```

Test your code using the following main() function.

```
def main():
   tri1=triangle(2,2,2)
   rect=rectangle(2,3)
   tri2=triangle(3,3,3)

   figures = [tri1,rect,tri2]
   for fig in figures:
      print "Type of Polygon =>", fig.whoamI()
      print "Sides =", fig.howmanysides()
      print "Area =", fig.area()
      print "Perimeter =", fig.perimeter()
```