Module: COS101
Department: Computer Science
Assignment: Term 4 Practical 4
Lecturer: Mr. C. K. Baker
Due date: 11 October 2024, 5 PM
Total: 50 marks

UWC Computer Science

UNIVERSITY of the WESTERN CAPE

Instructions

This practical will test your problem-solving ability using Java programming constructs, files, principles of object-oriented programming and exception handling. There are 2 questions in this assignment. Submit a compressed (.zip) file with all your code, your signed declaration of plagiarism and list of references. The submission file should be named **XXYYZZZ. zip** where **XXYYZZZ** corresponds to your student number.

Question 1: Word Counter [25 marks]

Write a Java program that reads a file `input.txt` containing a piece of text, separated by whitespace, and obtains a list of 5 words from the user. Print out how many times each word from the user appears in the file. Ignore lettercase and non-alphabetical characters and implement exception handling when reading the file. The file is supplied to you. Save your program as `Question1.java`.

Example input

```
List of words to count: ToM aS THEY he Soft
```

Example output

```
tom:      8
as:       11
they:     11
he:       10
soft:     2
```

Question 2: Polygons [25 marks]

Write a Java program that defines a `Polygon` interface with methods `area( )` and `perimeter( )`. Then implement classes for `Triangle` and `Rectangle`, which implement this interface.

Formula sheet

- area of triangle: $base \times height$
- perimeter of triangle: $sideA + sideB + sideC$
- area of rectangle: $width \times height$
- perimeter of rectangle: $(2 \times width) + (2 \times height)$

Example usage

```
public static void main(String args[])
{
      Polygon triangle = new Triangle(5, 10, 5, 12, 13);
      System.out.println("Triangle Area: " + triangle.area());
      System.out.println("Triangle Perimeter: " + triangle.perimeter());

      Polygon rectangle = new Rectangle(4, 8);
      System.out.println("Rectangle Area: " + rectangle.area());
      System.out.println("Rectangle Perimeter: " + rectangle.perimeter());
}
```

Marking guide

Question 1

	Mark	Max.	Comment
Program structure and organisation		2	
User interaction, file reading with		10	

exception handling			
Correct reporting of word counts		10	
Error-free compilation and code quality		3	

Question 2

	Mark	Max.	Comment
Program structure and organisation;		3	
Correct definition of `Polygon` interface		2	
Correct implementation of `Triangle` class with appropriate attributes and a loaded constructor		5	
Correct implementation of `area()` and `perimeter()` for `Triangle` class		5	
Correct implementation of `Rectangle` class with		5	

appropriate attributes and a loaded constructor			
Correct implementation of `area()` and `perimeter()` for `Rectangle` class		5	