Introduction to Java for C++ Programmers
JAC 444
Assignment 02

Please read the following guidelines very carefully before answering any questions:

- Please make sure to read all the questions and guidelines very carefully before asking any questions.
- You will at least define a class with the main method for each question.
- You must keep the class name requested in each question.
- You must hold the naming conventions requested in this document and each question.
- All deliverables are defined at the end of this document. You must upload them as requested.

*It will be up to a **20%** mark deduction if you do not follow the abovementioned guidelines.*

1) (Class Name: *Scores*, Java File Name: *Scores.java*)
Write a program that reads student scores, gets the best score, and then assigns grades based on the following scheme:

The grade is A if the score is $\geq best - 10$;
The grade is B if the score is $\geq best - 20$;
The grade is C if the score is $\geq best - 30$;
The grade is D if the score is $\geq best - 40$;
The grade is F otherwise.

The program prompts the user to enter the total number of students, then prompts the user to enter all of the scores, and concludes by displaying the grades (You must use Array in your program). Here is a sample run: [25 Points]

```
Enter the number of students: 4
Enter 4 scores: 40 55 70 58
Student 0 score is 40, and their grade is C
Student 1 score is 55, and their grade is B
Student 2 score is 70, and their grade is A
Student 3 score is 58, and their grade is B
```

2) (Class Name: *MyInteger*, Java File Name: *MyInteger.java*)
Design and write a class named MyInteger. The class contains:

- An int data field named value that stores the int value represented by this object.
- A constructor that creates a MyInteger object for the specified int value.
  - MyInteger (int newValue) { … }
- A getter method that returns the int value.
- The methods isEven() and isOdd() that return true if the value in this object is even or odd.
- The static methods isEven(int) and isOdd(int) that return true if the specified value is even or odd.
- The static methods isEven(MyInteger) and isOdd(MyInteger) that return true if the specified value is even or odd.
- The methods equals(int) and equals(MyInteger) that return true if the value in this object is equal to the specified value.

In the main method, write a testing program that tests all methods in the class. [35 Points]

3) (Class Name: *Triangle*, Java File Name: *Triangle.java*)

Design and write a class named Triangle that extends GeometricShape (See the sample codes for this class). The class contains:

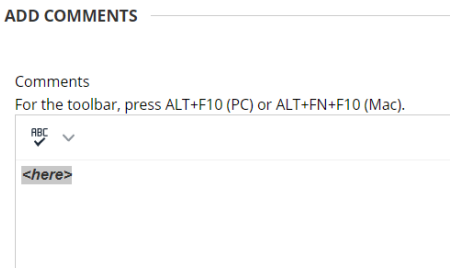
- Three double data fields named side1, side2, and side3 with default values 3.0, 4.0, and 5.0 denote three sides of a triangle.
- A no-arg constructor that creates a default triangle.
- A constructor that creates a triangle with the specified side1, side2, and side3.
- The accessor methods for all three data fields.
- A method named getPerimeter() that returns the perimeter of this triangle.
  - Perimeter: $p = side1 + side2 + side3$
- A method named getArea() that returns the area of this triangle.
  - Area: $a = \sqrt{\left(\frac{p}{2}\right)\left(\frac{p}{2} - side1\right)\left(\frac{p}{2} - side2\right)\left(\frac{p}{2} - side3\right)}$
  - Square Root method in Java: Math.sqrt()
- A method named toString() that returns a string description for the triangle.
  - For example if we have a triangle with the following sides (3.0, 4.0, 5.0), the toString() method must return:

    ```
    Triangle: side1 = 3.0, side2 = 4.0, and side3 = 5.0
    ```

In the main method, write a testing program that prompts the user to enter three sides of the triangle, a colour, and a Boolean value to indicate whether the triangle is filled. The program should create a Triangle object with these sides and set the colour and filled properties using the input. The program should display the area, perimeter, colour, and true or false to indicate whether it is filled or not. [40 Points]

Deliverables:

A) Create an up to **15 minutes** video explaining your answers, upload it on YouTube, and put the link of your video in the "Comments" section of your assignment submission.



See "How to make a video and upload it on YouTube?" under the "Course Information" on the Blackboard.

Your video must at least contain the following content:

a. Explaining the key components of your code and how they work.
b. Showing three different runs and outputs of your code.

Note: There is no mark if you just read your code. You must explain your code, not read it.

B) You must upload all requested Java files (i.e. "*.java") as they are.

There is no mark of you submitting any compressed file (e.g. zip, RAR, etc.)

There is no mark of you submitting "*.class" files.