OOPS LAB

PROGRAMMING ASSIGNMENT № 9

CLASSES AND OBJECTS IN JAVA

CSE Department, JMI 17/10/2023

Read carefully before you begin:

- Total Marks: 30. Each question carries 10 marks.
- You have 2 hours to complete the assignment. Failure to have your program evaluated before you leave the lab will cause forfeiture of the grade for that lab.
- In order to receive full marks, you must demo the full working code and show the output and given an explanation of your approach where applicable.
- Please **save your code** throughout the semester in a place where you do not lose it. You will be required to submit it at the end.
- Use proper filenaming conventions and commenting. Code that is hard to read or understand will incur a penalty.
- Collaboration must kept to general discussions only. Please do NOT share code or directly share answers with each other. Plagiarism is unacceptable.

Problem 1 : Java Setup (10 marks, 30 minutes)

1. Check if the Java compiler is available on your machine. Check the version. For temporal context, the first version of the compiler was released on January 23, 1996 (27 years ago) and the most recent version as of this writing was released on 19th September, 2023 (less than a month ago). Would you say that Java is a "successful" technology? What makes a technology successful?
2. List the full forms of the acronyms "JDK", "Java SE", "JRE". What do they mean?
3. Write a basic "Welcome to JMI" program within a class called "JavaAtJMI". What should you name the file? Compile the class and execute. Note: You need to first compile to a bytecode file that will have the extension ".class". Then you have to interpret this bytecode for your system using the interpreter.

Problem 2: Point in Java (10 marks, 60-90 minutes)

1. Write a **Point** class in Java which has a default and parameterized constructor. (Should it have a destructor?). It should have **distFrom** and **midPoint** functions.

2. Now define class **Element** and let **Point** extend **Element**. Which virtual functions will the **Element** class have? (Is there a "virtual" keyword in Java?)

Problem 3: Centroid Computation (10 marks, 60 minutes)

1. Instantiate 10000 points with random locations. A set of points such as this is called a "point cloud." Find the centroid of the point cloud. Can you use **Element** type pointers to do this?
2. Use an **Element** pointer to instantiate a **Point** object. Use **instanceOf** to find what kind of object the pointer points to.
3. Cast the pointer to **Point** type.