

CISC 3115 Test-2

Please complete the test and submit it as a plain text email with the subject "CISC 3115 Test2" to nzhou@brooklyn.cuny.edu by midnight on Friday, November 26.

Question 1

Does each of the following programs compile and run? If no, explain the reason; otherwise, give the output.

```
1. class P1 {
    public static void main(String[] args){
        A b = new B();
        B a = b;
        a.show();
        b.show();
    }
}

class A {
    public String str="A";
    public void show(){
        System.out.println(str);
    }
}

class B extends A {
    public String str = "B";
    public void show(){
        System.out.println(str);
    }
}
```

```
2. class P2 {
    public static void main(String[] args){
        A o = new B();
        o.m();
    }
}

class A {
    char x = 'a';

    public char getX(){
        return x;
    }

    public void m(){
        System.out.println(getX());
    }
}

class B extends A {
    char x = 'b';

    public void m(){
        System.out.println(getX());
    }
}
```

```
3. import java.util.*;

class P3 {
    ArrayList<Object> lst;

    public void add(Object obj){
        if (!lst.contains(obj))
            lst.add(obj);
    }
}

public static void main(String[] args){
    P3 d = new P3();
    d.add(1);
    d.add(1);
    d.add(2);
    d.add(2);
}
```

```
4. class P4 {
    public static void main(String[] args) {
        try {
            int value = 1;
            if (value / 0.0 > 0)
                System.out.println("true");
        }
        catch (Exception ex) {
            System.out.println(ex.getMessage());
        }
        System.out.println("Continue after the catch block");
    }
}
```

```
5. import java.util.Scanner;

class P5 {
    public static void main(String[] args) {
        Scanner input = new Scanner("abc 123");
        try {
            int i = input.nextInt();
        }
        catch(Exception ex) {
            System.out.println("A");
        }
        finally {
            System.out.println("B");
        }
    }
}
```

Question 2:

Write a class named `Pentagon` that extends `GeometricObject` and has the following specification. Assume all five sides of the pentagon are of equal size.

```
public class Pentagon extends GeometricObject {
    private double side;

    /** Construct a Pentagon with the specified side */
    public Pentagon(double side) {
    }

    /** Implement the abstract method findArea in GeometricObject */
    public double findArea() {
    }

    /** Implement the abstract method findPerimeter in GeometricObject */
    public double findPerimeter() {

    }

    /** Override the toString method in the super class such that it concatenates
        the side, perimeter, and area to the string returned by the toString()
        method of the super class */
    @Override
    public String toString() {
    }
}
```

Question 3:

Implement a class named `MySortedArrayList`, which extends `java.util.ArrayList` for storing a list of integers in *non-increasing* order. The class contains the following methods:

- 3.1. `public boolean add(Integer elm)`: This method inserts `elm` into the list such that the list remains sorted in non-increasing order after insertion. For example, if this list is `[5,1]`, then the call `add(3)` on the list changes the list to `[5,3,1]`.
- 3.2. `public MySortedArrayList intersection(MySortedArrayList lst)`: This method returns the intersection of this list and the given list `lst`. The returned list must be sorted in non-increasing order. For example, if this list is `[5,3,1]` and `lst` is `[5,4,3]`, then the returned list is `[5,3]`.

Implement the class `MySortedArrayList`.

Question 4:

Implement the following functions (static methods):

- 4.1. `public static ArrayList<Object> postfix(ArrayList<Object> lst, int n)`: This function returns the postfix of `lst` that contains the last `n` elements of `lst`. It throws a `RuntimeException` if `lst` has fewer than `n` elements. For example, if `lst` is `['a', 'b', 'c', 'd']` and `n=3`, then it returns `['b', 'c', 'd']`.
- 4.2. `public static Double rms(ArrayList<Double> lst)`: This function returns the *root mean square* (rms) of `lst`. Let `lst` be `[x1, x2, ..., xn]`. The rms of `lst` is $\sqrt{\frac{x_1^2 + x_2^2 + \dots + x_n^2}{n}}$.

Question 5:

Suppose that a text file contains an unspecified number of English words separated by blank spaces. Write a program that prompts the user to enter the file name, reads the words from the file, and displays the unique words in alphabetical order. For example, for a file that contains

ask not what your country can do for you ask what you can do for your country

your program should output

```
ask
can
country
do
for
not
what
you
your
```