Final Exam F2021

Please **DO NOT START** the exam until instructed, out of fairness to all students. 110 minutes.

Score: _____ / 94 pts

Name: ________________________
1. What is the output of the following code? (24 points)

```java
import java.util.ArrayList;
import java.util.Arrays;
public class Exam{
    private ArrayList<String> list;
    private static String color = "yellow";
    private static int count = 3;
    private int number;
    private int[] ages = {12};

    public Exam(int number){
        number = number;
        count++;
    }

    public int[] func1(){
        this.ages[0] = 11;
        return ages;
    }

    public static void main(String[] args){
        int count = 2;
        int num1 = 5;
        Exam exam1 = new Exam(num1);
        System.out.println(exam1.color);
        System.out.println(exam1.count);
        System.out.println(exam1.list);
        System.out.println(exam1.number);
        System.out.println(Arrays.toString(exam1.ages));
        Exam exam2 = new Exam(7);
        System.out.println(exam1.color);
        System.out.println(exam1.count);
        System.out.println(exam1.list);
        System.out.println(exam1.number);
        System.out.println(Arrays.toString(exam1.ages));
        exam1.color = "blue";
        int[] array = exam1.func1();
        array[0] = 2;
        exam1.list = new ArrayList<String>();
        exam1.list.add("bird");
        System.out.println(exam1.color);
        System.out.println(exam1.count);
        System.out.println(exam1.list);
        System.out.println(exam1.number);
        System.out.println(Arrays.toString(exam1.ages));
        System.out.println(exam2.color);
        System.out.println(exam2.count);
        System.out.println(exam2.list);
        System.out.println(exam2.number);
        System.out.println(Arrays.toString(exam2.ages));
        System.out.println(count);
        System.out.println(color);
        System.out.println(num1);
        System.out.println(Arrays.toString(array));
    }
}
```

WRITE OUTPUT HERE:
What is the output of the following code? (15 points)

```java
import java.util.Arrays;

public class Exam2{
    public static void main(String[] args) {
        int one = 1;
        int[][] numbers = {{3, 4}, {one}, {}};

        System.out.println(one);
        System.out.println(numbers[0][0]);
        System.out.println(numbers[0][1]);
        System.out.println(Arrays.toString(numbers[1]));
        System.out.println(Arrays.toString(numbers[2]));

        one = 2;
        System.out.println(one);
        System.out.println(numbers[0][0]);
        System.out.println(numbers[0][1]);
        System.out.println(Arrays.toString(numbers[1]));
        System.out.println(Arrays.toString(numbers[2]));

        numbers[1][0] = 7;
        numbers[2] = new int[1];
        numbers[2][0] = 0;
        numbers[0][0] = -1;

        System.out.println(one);
        System.out.println(numbers[0][0]);
        System.out.println(numbers[0][1]);
        System.out.println(Arrays.toString(numbers[1]));
        System.out.println(Arrays.toString(numbers[2]));
    }
}
```
3. What is the output of the following code? (10 points)

```java
import java.util.Arrays;

public class Exam3{
    public static int[] func1(int one, int[] num){
        one++;
        num[0] = 11;
        int[] arr = num;
        arr[0]++;
        return arr;
    }
    public static void main(String[] args){
        int one = 1;
        int[][] numbers = {{3, 4}, {one}, {}};
        System.out.println(one);
        System.out.println(numbers[0][0]);
        System.out.println(numbers[0][1]);
        System.out.println(Arrays.toString(numbers[1]));
        System.out.println(Arrays.toString(numbers[2]));
        numbers[2] = func1(one, numbers[1]);
        numbers[1][0] = 7;
        System.out.println(one);
        System.out.println(numbers[0][0]);
        System.out.println(numbers[0][1]);
        System.out.println(Arrays.toString(numbers[1]));
        System.out.println(Arrays.toString(numbers[2]));
    }
}
```

WRITE OUTPUT HERE:
4. Complete the code below that performs the following functionality: (20 points)

Write code that returns an `ArrayList` of all strings that have a length of at least 3 characters in an input array of strings. Your answer must correctly use generics.

```java
import java.util.List;

public List<String> longerStrings(String[] inputArray) {
    return Arrays.stream(inputArray)
                 .filter(s -> s.length() >= 3)
                 .collect(Collectors.toList());
}
```
5. Complete the code below that performs the following functionality: (15 points)

Write code that loops through a two-dimensional array of integers (grid) and counts all the pairs of adjacent numbers on a row that sum to 10.

For example, for the input
int[][] grid = {{1, 9, 2, 2, 8}, {10, -1, 3, 7, 1}};

The expected return value from your countAdjacentTen method would be 3

```java
public ___________ countAdjacentTen(int[][] grid){
```
Multiple choice (10 points)

6. Which of the following is true about the constructors for a class called Person?
   a. You can call the default constructor Person() without having written one.
   b. You can write multiple constructors for the Person class.
   c. A constructor can be called without the new keyword, or with it, for Person.
   d. A and B
   e. B and C
   f. A, B, and C

7. A private method can only access private attributes/fields in the same class.
   a. True
   b. False

8. A private method can only access other private methods in the same class.
   a. True
   b. False

9. A static method can only access static attributes/fields in the same class.
   a. True
   b. False

10. A static method can only access other static methods in the same class.
    a. True
    b. False

11. A public method can only access other public attributes/fields and methods in the same class.
    a. True
    b. False

12. If I have the statement String animal = “tiger”; what does animal.charAt(2) return?
    a. The character ‘i’
    b. The String “i”
    c. The character ‘g’
    d. The String “g”

13. What gets stored in num1 after the assignment int num1 = (int) 1.3;
    a. 0 (an integer)
    b. 0.0 (a floating point)
    c. 1 (an integer)
    d. 1.0 (a floating point)
    e. 1.3

14. What does the expression “3“ + 5 evaluate to in Java?
    a. 35 (an integer)
    b. 8 (an integer)
    c. “8”
    d. “35”
    e. It raises an exception

15. What gets printed for the code at the right:
    a. 1
    b. 2
    c. 3
    d. 4
    e. 5
    ```java
    int x = 13;
    int y = 1;
    if(x > 5){
        y = 2;
    }
    if(x > 12){
        y = 3;
    }else if (x > 5){
        y = 4;
    }else{
        y = 5;
    }
    System.out.println(y);
    ```
Scratch paper