

CMSC 132 Quiz 1 Worksheet

The first quiz for the course will be on Wed, Feb 10. The following list provides additional information about the quiz:

- **Do not post any solutions to this worksheet in Piazza.**
- The quiz will be a written quiz (no computer).
- The quiz will be in lab session.
- Closed book, closed notes quiz.
- Answers must be neat and legible.
- Quiz instructions can be found at <http://www.cs.umd.edu/~nelson/classes/utilities/examRules.html>
- Make sure you know your section number and your TA's name.
- **You must take your quiz in your assigned lab/discussion section and not show up to a random discussion section. We will not grade quizzes taken in the incorrect section.**

The following exercises cover the material to be included in this quiz. Solutions to these exercises will not be provided, but you are welcome to discuss your solutions with the TAs or instructors during office hours. It is recommended that you try these exercises on paper first (without using a computer).

Exercises

1. Read the document available at:

<http://www.cs.umd.edu/~nelson/documents/SuggestionsForWritingComputerPrograms.htm>

2. Define a class Telephone according to the following information:

Instance Variables (all private)

- a. area code → integer value
- b. three digit value → integer value
- c. four digit value → integer value
- d. user name → String reference

Instance Methods

- a. **Constructor** - Allows you to initialize all the instance variables of the class. Name the parameters after the instance variables (i.e., you must use the **this** reference)
- b. **Default constructor** - Initializes the object to the number 555-555-5555 and the name to null. This constructor relies on the previous constructor for the object initialization (i.e., you must use the **this** reference)
- c. **Copy constructor**
- d. **Get/Set methods** - Define get/set methods for all instance variables of the class.
- e. **equals** - Two numbers are considered the same if they have the same area code, three and four digit values. Use instanceof to implement this method (the approach described in class).
- f. **toString** - Returns a string with the user name followed by the phone number of the person.

Static Variable (private)

- a. **count** - keeps track of how many Telephone objects has been created.

Static Method

- a. **getCount** - Returns the count value
- b. **getDigits** - Takes a String reference as a parameter and returns the number associated with the string. For example, if the String has the value "CAR" the method will return the integer 227

3. What is encapsulation? How does it relate to abstraction?
4. What is the difference between procedural abstraction and data abstraction?

5. For this quiz, you will need to provide examples of academic integrity violations. The following is the list you need to know:
- Hardcoding of results in a project assignment.
 - Using any code available on the internet/web.
 - Hiring any online service to complete an assignment for you.
 - Posting your implementation of any class project on the internet/web.
 - Discussing projects with your classmates.
 - Sharing your code or your student tests with any student.
 - Looking at another student's code.

6. Write a static method that is given a 2-dimensional array of doubles and finds the first row that consists of an increasing sequence of values, that is, it finds the smallest i such that:

$$\text{array}[i][0] < \text{array}[i][1] < \text{array}[i][2] < \dots$$

If such a row exists, a copy of the contents of that row is returned as a one dimensional array. Otherwise null is returned. The signature of the method is:

public static double[] firstIncreasing(double[][] array);

7. Define an enumerate type named **Day** that represents the days of the week. Using the enhanced for loop construct, write a code fragment that prints all the days of the week.
8. The **PrinterJob** class is defined as follows:

```
public class PrinterJob {
    private int id;
    private int size;

    public PrinterJob(int id, int size) {
        this.id = id;
        this.size = size;
    }

    public int getId() { return id; }

    public int getSize() { return size; }

    public String toString() {
        return "Id: " + id + " Size: " + size;
    }

    public int hashCode() {
        return id;
    }
}
```

- Add a new private field "jobType" as an enumerated type with the values COLOR and BW.
- Modify the class so it implements the Comparable interface, allowing you to compare PrinterJob objects based only on their id.
- Implement a comparator class named SizeComparator that allow us to compare PrinterJob objects based on their size.