Topics for CSC 205 Quiz #1 **Monday, September 19th**

Quiz #1 will cover our class notes, handouts, and our first three labs since the start of the semester. The following topics are especially important to review :

- Definition of ADT, class, & object. How do you declare an object? What is the only Java object that does not require new with constructor at declaration? String
- Declaring an array object of any dimension and calculating the number of elements stored within it; Advantages and disadvantages of arrays; How are all arrays stored in RAM?
- Writing a class method for filling up, printing out, summing up, and finding the max or min of a two-dimensional array; Know how to pass arrays as parameters
- Using instance and class methods, instance and class variables, constructors, the `this` operator, and overloading
- The String ADT; Using the `indexOf`, `substring`, and `compareTo` methods
- The BitSet ADT; Declaring and using the instance methods of it
- Generating random numbers in Java. Is `Math.random()` a class method?

Math. PI — Math: class, PI: variable

s.length — s: object variable (instance); length

when to use static, void, etc.

Computer Science 205 Quiz #1

24/50

Monday, September 19th, 2016

50 points

Name : Yu-Ching

method = = parenthesis

1. Determine whether each of the following is an example of a class method, instance method, class variable, or instance variable. (1 point each)

   (a) `Math.sqrt(64.0)` Class variable method

   (b) `list.length` class variable iv

   (c) `Character.isLowerCase('H')` instance method cm

   (d) `Math.PI` class variable

   (e) `name.indexOf("GA")` instance void method

   (f) `s.length()` instance variable iv

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2. Short Answer on Arrays (2 points each)

   error when program is compiled / running out of memory

   (a) The line of code below contains either a compiler error or a run-time error. Which one is it? Explain exactly why.

   ```
   int[][][][][][][][][] a = new int[10][10][10][10][10][10][10][10][10];
   ```

   Run-time error

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   (b) Supposed a has been declared as a two-dimensional array. If you wanted to print its contents using a nested loop, how can you quickly determine exactly how many rows and columns a has?

   See how what the interg integers are in new int [x][y]

   x = number of rows

   y = number of columns

   a[0].length = # of rows

   -2

   (c) Suppose an array of `int` values has 50 rows and 40 columns. How many bytes of memory will be required to store the elements of the array?

   2000 bytes

   *4 = 8,000

   -2

3. (a) Using one line of code, declare and initialize an array that will hold five state abbreviations. (2 points)

```
String [] state = new String {'GA', 'CA', 'FL', 'NC', 'SC'};
```

(b) Write a code fragment (not a complete method) to count the strings in your array that would precede "GA" in the dictionary. You must use the compareTo method in your solution. (6 points)

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```
int result = 0;
String [0] = state.compareTo(String[1]);
String [1] = state.compareTo(String[2]);
String [2] = state.compareTo(String[3]);
String [3] = state.compareTo(String[4]);
String [4] = state.compareTo result = state compareTo String[4] = result;
System.out.print(result);
```

(c) Write a complete class method that will find the maximum string in your array (i.e., the one that would appear last in dictionary order). (8 points)

```
String [] state = new String {'GA', 'CA', 'FL', 'NC', 'SC'};
System.out.println("Maximum string array: " + max);
```

-3

```
private static String MAX (state[]) {
    int max = 0;

    if (max < String[i])
        max = String[i];

    }

    return max;
}
```

4. Short Answer (2 points each)

(a) Describe two disadvantages of an array.

Must know how many elements in array beforehand

Arrays are fixed, so usually waste space by having empty elements

(b) What does it mean to pass a parameter *by reference*? Give an example.

When an object is initalized and called later in a public/priv
class to be used.
Like initailizing an array, then using private classes to calculate th
sum, average and range of array list.

(c) What is `this`? Give an example.

keyword. reference to object

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5. Given the following declaration.

```
String s = "mercer university";
```

Write a code segment that can be used to count the number of occurrences of the substring "er" in string s. In this case, it would produce 3. Hint : Use the overloaded version of `indexOf`. (6 points)

```
String s = "mercer university"
int count = 0;
for (int i = 0; i < s.length; i++) {
    s.substring(i,i)
    int count = 0;
    s.substring('er');
}
return count;
System.out.println("Count : " + count);
```

abracadabra

-3

6. Given the following class definition.

```
public class Person
{
  private String name;
  private int    id;
  private static int personCount = 0;

  // constructor
  public Person(String pname)
  {
    name = pname;
    personCount++;
    id = 100 + personCount;
  }

  public String  toString()
  {
    return "name: " + name + "  id: " + id
      + "  (Person count: " + personCount + ")";
  }

  // static/class method
  public static int getCount()
  {
    return personCount;
  }
}
```

(a) What is the output of the following code segment? (6 points)

```
Person charles = new Person("Charles Babbage");
System.out.println(Person.getCount());
System.out.println(charles);
Person ada = new Person("Ada Lovelace");
System.out.println(ada.getCount());
Person ed = new Person("Ed Roberts");
System.out.println(Person.getCount());
```

Name: Charles Babbage id: 101
(Person count: 1)
Name: Ada Lovelace id: 102
(Person count: 2)
Name: Ed Roberts id: 103
(Person count: 3)

(b) Add a setter method to this class that will allow the user to reset all instance variables to the values sent in as a parameter. (4 points)

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```
public void set(String, int id) {
    this.name = name;
    this.id = id;
}
```