Set 10 Study Questions

`1.` How many `ints` are created by the statement: `int[] a = new int[5];`

2. How many Strings are created by the statement: `String[] a = new String[5];`
(Hint: The answer to this question and the previous question are different!)

3. Are the elements of an array of primitives automatically initialized? If so, to what values?

4. Are the elements of an array of references to objects initialized? If so, to what values?

5. Draw the memory diagram for each of the following code fragments:

```
a.    int[] a = new int[4];
b.    String[] b = new String[4];
   for (int i = 0; i < b.length; i++)
    b[i] = _value _ + i;
```

6. Write a class that has an instance variable which is an array of `Cat` objects, called `kitties`. Write a method that returns a reference copy of `kitties`. Write a method that returns a shallow copy of `kitties`. Write a method that returns a deep copy of `kitties`.

7. Suppose you are passing (or returning) an array of primitives to/from a method. Is it safe to make a reference copy only?

8. Suppose you are passing (or returning) an array of references to immutable objects to/from a method. Is it safe to make a reference copy only? Is it safe to make a shallow copy?

9. Suppose you are passing or returning an array of references to mutable objects to/from a method. Is it safe to make a reference copy only? Is it safe to make a shallow copy?

10.

a. Write a code fragment that creates a two-dimensional ragged array of ints with 3 rows, initialized with the following data:

5 8 9

4 11 13 15 17

0 1

b. After you have created this array, write code that will print the contents in the same format that you see above.

c. Draw the memory map for this array.

11.

a. Write a method called catDuplicator, with the following prototype:

```
public Cat[][] catDuplicator(int[] rowSizes, Cat c)
```

The method will create a two-dimensional ragged array, using the array _rowSizes_ to determine how many rows there are, and how long each row must be. Each element of the array that gets created will refer to the very same cat, `c`.

For example, if the array `rowSizes` contains the data: 5 7 2 1

then the return value would be a two-dimensional ragged array with four rows. The first row would be size 5, the second row would be size 7, etc. Each element of the two-dimensional array must be a reference to `c`.

b. Draw the memory map for the method above.

12. Write code that asks the user for a value (n), and then creates an n by n two-dimensional array of ints. Fill the array with a multiplication table. For example, if n is 3, the table should be:

1	2	3
2	4	6
3	6	9

13. a.

Write a method which has the following prototype:

public static double[] linearize(double[][] array)

The method linearizes the two-dimensional array by returning a one-dimensional array with all the elements of the parameter (selected row-by-row). The original array cannot be modified.

b. Write a JUnit test that tests your method.

14. Write a method called _deepCopy_ that takes a parameter (a two-dimensional array of String objects) and returns a deep copy. (You must make copies of the Strings themselves, even though they are immutable.)