1. What is your course section?
   Answer: ____________

2. Because an array is an object, it has a clone(), equals(), and toString() methods.
   YES _____ NO _____

Questions 3 – 9 consider the following class C.

```
public class C {
    private Point p; // instance variable
    public C(Point v) { // specific constructor
        p = new Point(v.getX(), v.getY());
    }
    public void set(Point v) { // instance method
        p = v;
    }
    public void perform(Point v) { // instance method
        v.setX(10);
        p.setX(10);
    }
    public void do(Point v) { // instance method
        v = new Point(10, 0);
        p = v;
    }
    public static int f(int x) { // class method
        return x + 7;
    }
    public static void g(int x) { // class method
        System.out.println(x + 7);
    }
}
```

3. Consider the following code segment.
   1. Point origin = new Point(0, 0);
   2. C item = new C(origin);

   After it completes, memory has the following depiction.

   ![Diagram of memory depiction](image)

   Do origin and item’s instance variable p (i.e., item.p) refer to equivalent Point objects after the following code segment?
   YES _____ NO _____
4. Consider the same code segment.
   1. Point origin = new Point(0, 0);
   2. C item = new C(origin);

   Do origin and item.p refer to the same Point object after the preceding code segment finishes?
   YES _____ NO _____

5. Consider the following code segment.
   1. Point origin = new Point(0, 0);
   2. C item = new C(origin);
   3. item.set(origin);

   Do origin and item.p refer to the same Point object after the preceding code segment finishes?
   YES _____ NO _____

6. Consider the following code segment.
   1. Point origin = new Point(0, 0);
   2. C item = new C(origin);
   3. item.perform(origin);

   Do origin and item.p refer to the same Point object after the preceding code segment finishes?
   YES _____ NO _____

7. Consider the following code segment.
   1. Point origin = new Point(0, 0);
   2. C item = new C(origin);
   3. item.do(origin);

   Do origin and item.p refer to the same Point object after the preceding code segment finishes?
   YES _____ NO _____

8. Consider the following code segment.
   1. int y = C.f(4);

   Does it compile?
   YES _____ NO _____

9. Consider the following code segment.
   1. int y = C.g(4);

   Does it compile?
   YES _____ NO _____

10. Write a single statement that defines and initializes an int array variable unit that is initialized to represent four 1s.
11. If you can, write a static void method swap() that takes two formal int parameters x and y. When invoked, the method is to interchange the values of its actual parameters. For example, with this method code segment:
   1. int a = 10;
   2. int b = 11;
   3. swap(a, b);
   4. System.out.println(a + " " + b);
should display
   11 10
If you cannot write the method explain why?

12. If you can, write a static void method swap() that takes three formal parameters: an int array a and two int variables i and j. When invoked, the method is to interchange the values of the i\textsuperscript{th} and j\textsuperscript{th} elements of the actual array parameter. For example, with this method code segment:
   1. int[] list = new list[3];
   2. int m = 1;
   3. int n = 2;
   4. a[m] = 10;
   5. a[n] = 11;
   6. swap(list, m, n);
   7. System.out.println(list[m] + " " + list[n]);
should display
   11 10
If you cannot write the method explain why?

13. Suppose b is an already defined and initialized int array with 5 elements. Write a single statement that defines and initializes an int variable i to the value of the first element in b.
14. Suppose $b$ is an already defined and initialized int array with 5 elements. Write a single statement that defines and initializes an int variable $i$ to the value of the last element in $b$.

Questions 15 – 18 have you complete and use the following class State, where class State provides a representation of two values interest in regard to a state — its name and population size.

```java
1. public class State {
2.     private String name; // represents name of the state
3.     private int size;  // represents number of people in the state
4.  
5.     public State() {
6.         // TO BE FILLED IN **************
7.     }
8.  
9.     public State(String s, int n) {
10.        name = s;
11.        size = n;
12.     }
13.  
14.     public String toString() {
15.         return "(" + name + ": " + size + ")");
16.     }
17.  
18.     public Object clone() {
19.         // TO BE FILLED IN **************
20.         return result;
21.     }
22.  
23.     public boolean equals(Object v) {
24.         // TO BE FILLED IN **************
25.     }
26. }
27. }
```

15. Write a single statement that can replace line 6 so that the default constructor initializes a State object to represent Virginia with its population of 7,078,515 people.

16. Write a single statement that can replace line 20 so that the clone() method produces a new object that is equivalent to the invoking (this) object.
17. Write a *code fragment* that can replace line 25 so that the `equals()` returns `true` if and only if `Object` parameter `v` is a `State` object equivalent to the invoking `(this)` object.

18. Write a *single statement* that defines a `State` array variable named `usa`. The definition should cause `usa` to reference a new `State` array with fifty elements.

19. Write a static `int[]` method `makeCopy()` that takes a single formal parameter `a`, where parameter `a` is an `int` array `a`. When invoked, the method returns a new `int` array of size `a.length`. The elements of this new array are equal to the corresponding elements of `a`. 
20. Write a static boolean method isSorted() that takes a single formal parameter $a$, where parameter $a$ is an int array $a$. When invoked, the method returns whether the elements of the list are in sorted order. Hint: an array $a$ is sorted if and only if $a[i] \leq a[i+1]$ for all valid $i$ and $i+1$. 

PLEDGE