CS1007 – Object Oriented Programming

Practice Midterm Examination

Professor S. Hershkop
Department of Computer Science
Columbia University
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1) Define the following terms, use complete sentences:
    a. Overriding

    b. Mutator

    c. inheritance

    d. sequence diagrams

    e. UML

2) Find 10 errors (there are more than 10) in the following Java code. The errors are both syntactic (compiler errors) and logical (bugs). For each error, identify the line number and briefly explain how to fix it.

```
1. private class Circle {
2. public static final float PI = 3.14 ;
3.
4. private double x, y ; /* The center of the circle. */
5. private double r ; /* The radius of the circle. */
6.
7. public Circle(double r) {
8. this(0.0,0.0,this.r) ;
9. }
10.
11.     public double Circle(double x, double y, double r) {
12.     this.x = x ;
13.     this.y = y ;
14.     this.r = r ;
15.
16.     /* Returns the area of the circle. */
17.     public double area() {
18.      return PI * r^2 ;
19.       }
20.
21.      /* Indicates whether a point is on the boundary of the
   circle.
22.     public boolean onCircle(double x1, y1) {
23.     int dx = x1 - x ;
24.     int dy = y1 - y ;
25.     return dx*dx + dy*dy == r*r ;
26.       }
27.
28.     /* Creates a series of concentric circles */
29.     public static void main(string[] args) {
30.     int i ;
31.
32.     for( int i=0 ; i < 10 ; i++ )
33.     Circle c = Circle(10.0*i) ;
34.     System.out.println("r="+c.r+" A="+c.area) ;
35.       }
36. }
```

3. What is the difference between a public and private member of a Java class?

4. Write a **ThreeWayLamp** class that models the behavior of a lamp that uses a three-way bulb. These bulbs have actually four possible states: off, low light, medium light, and high light. Each tim the switch is activated, the bulb goes to the next state (from high, the next state is off, from off to low etc). The **ThreeWayLamp** class has a single method called **switch()** which takes a single int parameter indicating how many times the switch is activated. (you need to throw an exception if its negative). The **switch()** method should simply print out to **System.out** a message indicating the state of the bulb after it has changed.

5.

a. Correct the following lines of code:

```
public static void doSomething(int n)
{
        if( n < 0)
                throw new Exception("Negative!");
}
```

b. What happens if an exception is thrown inside a method invocation but the exception is not caught inside the method??

c. What happens in Java when you add the keyword **final** to a method
`(final public void foo())`?

6. Show the output produced by the following code:

```
1. public class tmp {
2.      int data[] = {0, 1, 2, 3, 4, 5, 6, 7, 8, 9};
3.
4.      public static void main(String args[]) {
5.       tmp foo = new tmp();
6.       foo.execute();
7.      }
8.      public void execute() {
9.       try {
10.              System.out.println(testIt(5));
11.              System.out.println(testIt(11));
12.              System.out.println(testIt(-3));
13.            }
14.          catch (ArrayIndexOutOfBoundsException e) {
15.              System.out.println("Index exception");
16.            }
17.          System.out.println("Goodbye World");
18.          }
19.        int testIt(int index) {
20.          try {
21.              return data[index];
22.          }
23.          catch (ArrayIndexOutOfBoundsException e) {
24.              if (index < 0) throw e;
25.              else return 10;
26.          }
27.          finally {
28.              System.out.println("leaving testIt");
29.          }
30.        }
31.      }
```