CSSE 220—Object-Oriented Software Development

Exam 1 – Part 1, Dec. 16, 2015

This exam consists of two parts. Part 1 is to be solved on these pages. If you need more space, please ask your instructor for blank paper. After you finish Part 1, please turn in your Part 1 answers and then open your computers and wait quietly for the programming exam review section of class to begin.

Allowed Resources on Part 1: You are allowed one 8.5" by 11" sheet of paper with notes of your choice. This section is *not* open book or open notes; and you are not allowed to use your computer for this part.

You will have 50 minutes (the first Rose hour of class) to complete Part 1. Part 2 will be completed on Friday, Dec. 18th.

Please, begin by writing your name on every page of the exam. We encourage you to skim the entire exam before answering any questions.

Problem	Poss. Pts.	Earned
1	10	_____
2	12	_____
3	8	_____
4	5	_____
Paper Part Subtotal	**35**	_____
Computer Part Subtotal	**65**	_____
Total	**100**	_____

Part 1—Paper Part

```java
public class Car {
    private double miles;
    private double gas;

    public Car(double miles, double gas) {
        this.miles = miles;
        this.gas = gas;
    }
    public void drive(double numMiles) {
        this.miles += numMiles;
        this.gas -= numMiles * .25;
    }
    public double getMiles() {
        return this.miles;
    }
    public double getGas() {
        return this.gas;
    }
}

public class Owner {
    private String name;
    private Car car;

    public Owner(String name, Car car) {
        this.name = name;
        this.car = car;
    }
    public void takeTrip(double oneWayMiles) {
        this.car.drive(oneWayMiles*2);
    }
    public void buyNewCar(Car car) {
        this.car = car;
    }
    public String getName() {
        return this.name;
    }
    public Car getCar(){
        return this.car;
    }
}
```

The next several questions all refer to the Car and Owner classes on the previous page showing its fields, constructors, and methods. The javadocs are omitted to save space. DO NOT TYPE THIS CLASS IN ECLIPSE.

1. (10 points, 3 each for a & b, 4 points for c) Below are several code snippets that use the Car and Owner classes. For each snippet, first *draw a box-and-pointer diagram* (in the blank area below the snippet) showing the *final* result of executing it (i.e., you do not have to show any of the intermediate steps of any of the temporary variables created in the various methods). Then *give the output* of the print statement at the end of the snippet.

```
Car c = new Car(1000.0, 13.0);
Owner o = new Owner("Steve", c);
System.out.println(c.getGas());
```

(a) **Diagram:**

Output:

```
Car c1 = new Car(500.0, 10.0);
Car c2 = new Car(1000.0, 5.0);
c2 = c1;
c1.drive(4.0);
System.out.println(c2.getMiles() + ", " + c2.getGas());
```

(b) **Diagram:**

Output:

```
Car[] cars = new Car[3];
cars[0] = new Car(200.0, 3.0);
cars[1] = new Car(0.0, 15.0);
Owner own = new Owner("Greg", cars[0]);
own.buyNewCar(cars[1]);
own.getCar().drive(10);
own.takeTrip(2.5);
System.out.println(own.getName() + " has driven "
    + own.getCar().getMiles() + " miles.");
```

(c) **Diagram:**

Output:

2. (12 points) Predict the output for each code snippet below. (You do *not* need to draw a diagram, but you may if it might help you.) DO NOT TYPE THE CODE SNIPPETS FOR THIS QUESTION IN ECLIPSE. If output spans multiple lines, write additional lines below the Output: line.

```java
String name = "Joe";
int x = 5;
int factor = 3;
int y = 6;
String text = "score of " + ((x + y) * factor);
System.out.println("Player " + name + ": " + text);
```

(a) Output: _____

```java
String[] words = { "Break", "is", "almost", "here!" };
String result = "";
for (String word : words) {
    int beginIndex = word.length()/2;
    int endIndex = word.length();
    result = result +
        word.substring(beginIndex, endIndex) + " ";
}
System.out.println(result);
```

(b) Output: _____

```java
// What does invoking the following
// method print for arguments (450, ''bc'')?
public void whatDoIDo(int test, String testString) {
    testString.replace("bc","ab");
    if (test < 500) {
        System.out.println("small");
    }
    if (testString.equals("ab")) {
        System.out.println("true!");
    }
    else {
        System.out.println("false!");
    }
}
```

(c) Output: _____

```java
ArrayList<Integer> list = new ArrayList<Integer>();
for (int i=1;i<=5;i++) {
    list.add(i);
}
for (int i=0;i<list.size();i++) {
    list.set(i, list.get(i)*i);
    System.out.println(list.get(i));
}
```

(d) Output: _____

3. (8 points) For each loop below, write down how many times its body will execute, infinity, or indicate that we can't tell from the information given. DO NOT TYPE THE CODE SNIPPETS FOR THIS QUESTION IN ECLIPSE.

```java
for(int i = 0; i < 50; i+=2){
    System.out.println(i);
}
```

(a) Answer: _____

```java
int a = 30;
int b = 0;
while (a != b){
    if (a < b) {
        b = b - a;
    }
    else {
        b = b + 3;
    }
}
System.out.println(a);
```

(b) Answer: _____

```java
ArrayList<String> items = new ArrayList<String>();
items.add("keys");
items.add("backpack");
items.add("calculator");
while(items.size() < 6){
    items.add("new item");
}
```

(c) Answer: _____

```java
int[] testArray = {4, 2, 5, 1, 8};
int sum = 0;
for(int i = 0; i >= testArray.length; i++){
    sum = sum + testArray[i];
}
```

(d) Answer: _____

4. (5 points) *W*rite T next to the statements that are true, F next to the statements that are false.

_____You may only have one constructor for a class in Java.

_____When an field of a class is static, there is only one instance of that field no matter how many instances of the class are constructed.

_____Static methods can access instance variables or instance methods directly.

_____This line of code if (string1 == string2) will check if two strings contain the same data.

_____This code creates a new HashMap of strings to integers:

HashMap<String, int> map = new HashMap<String, int>();

Turn in your answers to this part of the exam and wait quietly for class to resume. You may turn on your computer once this portion of the exam is turned in.