COMP 248 - Tutorial #9 - Solution

Introduction to Classes

Question 1: Assume the following class that represents a playing card.

```
public class PlayingCard
{
   private int value; // ex. 1 (ace) to 13 (king)
   private String color; // ex: "heart" "diamond" "club" "spade"

   public void writeOutput()
   {
       System.out.println(value + " of " + color);
   }
   public void randomCard()
   {
      value = (int)(Math.random()*13)+1;// a random integer between [1..13]
      switch ((int)(Math.random()*4)+1) // a random integer between [1..4]
       {
         case 1: color = "heart"; break;
         case 2: color = "diamond"; break;
         case 3: color = "spade"; break;
         case 4: color = "club"; break;
       }
    }
   public int isAFace()                    //public boolean isFace()
   {
       // is the value a jack (11), a queen (12) or a king (13)?
       return (value == 11 || 12 || 13);
     //return (value == 11 || value == 12 || value == 13);
   }
   public boolean isAnAce()
   {
       return (PlayingCard.value == 1);    // return (value == 1);
   }
}
```

And assume the following driver:

```
public class CardDriver{
  public static void main(String[] args)
  {
        PlayingCard mySecondCard = new PlayingCard();
        mySecondCard.randomCard();
        boolean answer = isAnAce();
        do
        {
           mySecondCard = randomCard();
           System.out.println(mySecondCard.isAFace());
           System.out.println(mySecondCard.writeOutput());
        }
        while (mySecondCard.isAFace());
  }
}
```

A- Name all the objects of the class `PlayingCard`.

B- Name all the methods of the class `PlayingCard`.

C- The class and the driver program contain several syntax errors. Identify and correct them.

```
//The "Playing Card " class
public class PlayingCard
{
    public int value; // ex. 1 (ace) to 13 (king)
    public String color; // ex: "heart" "diamond" "club" "spade"

    public void writeOutput() //a  method of the class PlayingCard
    {
        System.out.println(value + " of " + color);
    }
    public void randomCard() // a method of the class PlayingCard
    {
       value = (int)(Math.random()*13)+1;// a random integer between [1..13]
        switch ((int)(Math.random()*4)+1) // a random integer between [1..4]
       {
        case 1: color = "heart"; break;
        case 2: color = "diamond"; break;
        case 3: color = "spade"; break;
        case 4: color = "club"; break;
       }
    }

    public boolean isAFace()  //a  method of the class PlayingCard,
                              //Correction: Change the return type of this method
    {
        // is the value a jack (11), a queen (12) or a king (13)?
        return ((value == 11) || (value == 12) || (value == 13));
        //Correction: Change the Boolean Expression
    }
```

```
    public boolean isAnAce() //a  method of the class PlayingCard
    {
       // Correction. "value" is a variable of the same class of method "isAnAce"
       return (value == 1);     }
    }
//The driver class

public class CardDriver{
     public static void main(String[] args)
     {
        PlayingCard mySecondCard = new PlayingCard();//An  object of the class PlayingCard
        mySecondCard.randomCard();

       //Correction: we should use an object to invoke the method "isAnAce"
        boolean answer = mySecondCard.isAnAce();
        do
        {
            mySecondCard.randomCard();//Correction
            System.out.println(mySecondCard.isAFace());
            mySecondCard.writeOutput();//Correction. "writeOutPut" is a "void" method.
        } while (mySecondCard.isAFace());
     }
}
```

Question 2: Given the following class definition

```
public class Question {
   private int gradeQ1;
   private int gradeQ2;
   private int gradeQ3;
   private int total;
   public void computeTotal(){
          …
   }
   public int returnTotal(){
         …
   }
   public void printTotal(){
         …
   }
   public boolean getQuestionRight(){
               …
   }
}
```

1. How many states does an object of type class have and what are their names?
   There are 4 states of the object of type class. They are "gradeQ1", "gradeQ2, "gradeQ3" and "total".

2. Write down the complete header of one of the methods of class `Question`?

```
public void computeTotal()
public int returnTotal()
public void printTotal()
public boolean getQuestionRight()
```

3. What is the return type of the method `computeTotal` ()?
   void

4. What is the return type of the method `getQuestionRight`()?
   boolean

6. Complete the method `computeTotal`() so that calculates the total score (sum of `gradeQ1`, `gradeQ2` and `gradeQ3`).

```
public void computeTotal() {
   total = gradeQ1+gradeQ2+gradeQ3;
}
```

7. Complete the method `returnTotal`() which returns the total score.

```
public int returnTotal {
   return (total);
}
```

8. Complete the method `printTotal`() which displays the total score.

```
public void printTotal {
   System.out.println("The total is: " + total);
}
```

Question 3: Consider the following class:

```
public class AClass {
   private int a;
   public int b;

   public AClass() {
       a = 10;
       b = 10;
   }

   private void increment() {
       increment(1);
   }

   public void increment(int i) {
       a+= i;
       b+= i;
   }
}
```

and the following declaration in the driver class:

```
AClass obj1 = new AClass();
```

Indicate if the following instructions will cause a syntax error if they are placed in the driver class after the above declaration. If there is an error, briefly explain why.

```
System.out.print(obj1);
```

No syntax error,
However, since there is no "toString()" method define in the "AClass",
"System.out.print()" will output a list of meaningless characters., such as
"Aclass@757aef".

```
AClass.increment(5+5);
```

Syntax error.
Since method "increment" is not a "static" method in Class "AClass". We should use an object of class "AClass". Such as "obj1" to invoke it. As a result, if we only consider the syntax, there are two ways to correct this error.

a) Add modifier "Static" to corresponding "method" and "variable" in class "AClass".

```
public class Aclass {
   private static int a;
   public static int b;
   public Aclass() {… }
   private void increment() {…}
   public static void increment(int i) {
       a+= i;
       b+= i;
   }
}
```

b) In the driver class, change "`AClass.increment(5+5);`" to "`obj1.increment(5+5);`".

```
System.out.print(obj1.a);
```

Syntax error

Variable "a" is a private variable in class "AClass". So it is invisible in driver class.

```
System.out.print(obj1.b);
```

No syntax error, since variable "b" has a "public" modifier. So it is visible in driver class.