Question 1. [9 marks]
The following code compiles without errors:

```java
public class A {
    int num = 13;
    public A() {
        System.out.println("one");
    }
    public void report() {
        System.out.println("two");
    }
}

public class B extends A {
    int num = 2;
    public B() {
        System.out.println("here");
    }
    public void report() {
        System.out.println("all");
    }
}

public class C extends B {
    public C() {
        System.out.println("some");
    }
    public void report() {
        System.out.println("all");
    }
}
```

Part (a) [5 marks]
Suppose we have a main method in another class that says: `A var1 = new C();` This compiles and runs without error.

- What output will be created by constructing that instance of `C`? (Line breaks are omitted below to save space.)

  - [ ] some here one
  - [X] one here some
  - [ ] some

- If the expression `var1.num` is then used, which variable is accessed?

  - [X] The instance variable `num` in class `A`.
  - [ ] The instance variable `num` in class `B`.
  - [ ] The instance variable `num` in class `C`.
  - [ ] None of the above; this expression is illegal.

- If the expression `((C) var1).num` is then used, which variable is accessed?

  - [X] The instance variable `num` in class `A`.
  - [ ] The instance variable `num` in class `B`.
  - [ ] The instance variable `num` in class `C`.
  - [ ] None of the above; this expression is illegal.

- If the the method call `var1.report()` is then used, which method is called?

  - [ ] The method `report` in class `A`.
  - [ ] The method `report` in class `B`.
  - [X] The method `report` in class `C`.
  - [ ] None of the above; this method call is illegal.

- If the the method call `((B) var1).report()` is then used, which method is called?

  - [ ] The method `report` in class `A`.
  - [ ] The method `report` in class `B`.
  - [X] The method `report` in class `C`.
  - [ ] None of the above; this method call is illegal.
Part (b) [4 marks]

Define a public interface called Reportable that imposes just one obligation on those classes that implement it: they must have a method called report with the same signature as the one in class A. (I.e., Their report method must have the same accessibility, return type, name and parameters.)

```java
public interface Reportable {
    public void report();
}
```

Below, modify class A so that instances of it could be used anywhere a Reportable object is required.

The only change required is to say that A "implements Reportable":

```java
public class A implements Reportable {
    int num = 13;

    public A() {
        System.out.println("one");
    }

    public void report() {
        System.out.println("two");
    }
}
```
Question 2. [5 marks]

Part (a) [1 mark]
Suppose we are writing a program that will involve Sneetches and Smurfs. If I tell you that every Sneetch is a Smurf, which design makes the most sense?

- Class Sneetch is a parent of class Smurf.
- Class Smurf is a parent of class Sneetch.
- Classes Sneetch and Smurf are both children of a common parent class.
- A common child class has both class Sneetch and class Smurf as parents.

Part (b) [1 mark]
For any class that doesn’t have a no-argument constructor, Java will define one.

- True
- False

Part (c) [1 mark]
If a class has any methods that are not abstract, the class must not be declared to be abstract.

- True
- False

Part (d) [1 mark]
An abstract class can be instantiated as long as it has at least one method that is not abstract.

- True
- False

Part (e) [1 mark]
Suppose class C2 is a child of class C1. The private members of a class C1 can be accessed from within class C2.

- True
- False