

In-class Test 2

MSC/ICY SOFTWARE WORKSHOP 1

Assessed In-class Test: 20% of the continuous assessment mark.

Submission: Friday, 6 December 2013, 10:40 hours

No late submission

Usual examination conditions apply. You may not use any material during this in-class test.

Exercise 1: (Basic, 38%)

Let a list `l` of `int` be given, e.g. by `List l = new List(3, new List(4, new List(2, new List(1, new List()))))`. Write a recursive method that computes the `max` of a list, i.e., it should return the biggest integer in the list. In the example we should get on the call `max(l)` the integer 4. For the empty list, an exception should be raised. You can make use of the Java method `Math.max(int a, int b)` which return the maximum of two integers.

Exercise 2: (Medium, 30%) A class `Vehicle` is given as follows:

```
public class Vehicle {
    private double speed, weight;
    private int numberOfPeople;

    public Vehicle(double speed, double weight, int numberOfPeople) {
        this.speed = speed;
        this.weight = weight;
        this.numberOfPeople = numberOfPeople;
    }

    public String toString() {
        return "The vehicle has a max speed of " + this.speed + " km/h,\n" +
            "a weight of " + this.weight + " kg, and " +
            "can carry " + this.numberOfPeople + " person(s).";
    }
}
```

Extend the class to a subclass `Bicycle`, which can always carry only 1 person. Furthermore specify a variable `numberOfWheels` which is for all bicycles equal to 2. The `toString` method should be overridden so that it produces for `Bicycle b = new Bicycle(40, 18);` a string of the form:

```
The vehicle has a max speed of 40.0 km/h,
a weight of 18.0 kg, and can carry 1 person(s).
It has 2 wheels.
```

Exercise 3: (Advanced, 32%)

Let the following two classes A and B be given:

```
public class A {
    private String a;
    public String b;

    A(String a, String b) {
        this.a = a;
        this.b = b;
    }

    public String toString() {
        return this.a + " b: " + this.b;
    }
}

public class B extends A{
    private String a;

    B(String a, String b) {
        super(b,a);
    }

    public String toString() {
        return this.b + " a: " + this.a;
    }
}
```

What happens for the following calls in the main method?

[Read the code very carefully, details matter!]

(a) `A a = new A("1","2");`
`System.out.println(a);`

(b) `B b = new B("1","2");`
`System.out.println(b);`

(c) `A c = new B("1","2");`
`System.out.println(c);`

(d) `B d = new A("1","2");`
`System.out.println(d);`