EXERCISE 0

Java Reloaded - Arrays

Do It

1. *Arrays - compiling / running?*

   In Java Arrays are covariant - that means for example that String[] is a subtype of Object[]. Let's have a look at the following statements. Do they compile or do they work at run-time?

```
1  /* 1 */ String[] strings1 = new String[100];   correct for compiler und correct at runtime; simple array definition
2  /* 2 */ Object[] a1 = (String[]) strings1;     correct but typecast not necessary because String[]is a subtype of Object[]
3  /* 3 */ Object[] a2 = strings1;                correct: typecast is implicit
4  /* 4 */ Object[] strings2 = new String[]{ "1", "2", "3" };   correct but different at compiletime (Object-Array) and runtime (String-Array)
5  /* 5 */ String[] a3 = (String[]) strings2;     Correct at compiletime and runtime; improvement
6  /* 6 */ String[] strings3 = { "1", "2", "3" };   C  correct simple array definition
7  /* 7 */ Object[] a4 = strings3;                  C  correct, implicit typecast
8  /* 8 */ Object[] strings4 = { "1", "2", "3" };   C  incorrect,
9  /* 9 */ String[] a5 = (String[]) strings4;       R  wrong at runtime assignment from a subtype (stringarray) to a supertype (object array)
10
11 /* A */ int[] ints1 = new int[100];              C  correct
12 /* B */ Object[] a6 = (int[]) ints1;             R
13 /* C */ Object[] ints2 = new int[ 100 ];         C
14 /* D */ int[] a7 = (int[]) ints2;                R
```

2. *Arrays - find the shortest distance*

   The class java.awt.Point represents points with x/y coordinates. Have a look at the java.awt.Point API for more information. Write a Java program that finds the nearest/next restaurant in the city.

   (a) Given is a set of Point-objects in the points Array.

```
1  Point[] points = { new Point(10, 20), new Point(12, 2), new Point(44, 4) };
```

   (b) Write a method double minimumDistance(Point[] points, int size) that delivers the distance of this point that has the shortest distance to (0,0). size defines the amount of elements in the array.

   (c) null as parameter is not allowed, the points are not allowed to be null; an exception (IllegalArgumentException) has to be deliverd.

   (d) Write a method that delivers the Point itself with the shortest distance to (0,0).

3. *Arrays - be afraid of digit 5*

   Write a Java program that groups numbers hosting digit 5 at the end of an array.

   (a) Write a method fiveAtLast(int... numbers) that places all numbers containing digit 5 after numbers that do not contain digit 5.

   (b) The order of numbers without 5 does not change! The numbers containing 5 can be anywhere at the end of the array.

   (c) The method fiveAtLast(...) delivers this array that was delivered as input for the method.

   (d) null as parameter is not allowed; an exception (IllegalArgumentException) has to be deliverd.

   (e) Example: the original array {1, 55, 2, 5, 53} will be transformed to {1, 2, 55, 5, 53}. 1 and 2 are not allowed to be reordered.