Assignment 1

- Write heapsort
  - a method that takes an array of ints and sorts it by heapsort

- overview of heapsort
  - sorting using a heap
    - heap – binary tree where each node has smaller value than its children
  - heap is constructed directly in the array
    - children of the node \( i \) are \( 2i+1 \) and \( 2i+2 \)

```java
void heapSort(int[] a) {
    heapify(a, a.length);
    end = a.length - 1;
    while (end > 0) {
        swap(a[end], a[0]);
        siftDown(a, 0, end-1);
        end--;
    }
}
```
Assignment 2

- Write quicksort
- Compare speed of both algorithms
  - create a big array and fill it with random data
    
    ```java
    java.util.Random r = new Random()
    x = r.nextInt();
    ```
  
  - calculate necessary time
    
    ```java
    long before = System.nanoTime();
    ....measured part....
    long after = System.nanoTime();
    long dobaBehuNanos = after - before;
    ```
Assignment 3 – for fast ones

• Create a hash table
  – write the class MyHashTable, which serves as a hash table
    • keys String
    • values Object
    • methods at least
      - Object get(String key)
      - void set(String key, Object value)
      - iterator over keys

• variant for the „brave ones“ – create the hash table as a generic type (i.e. keys and values are generic)
  - create a program that counts number of words in a given file
Tests...
Test 1

• What is printed out

```java
public interface Test {
    public static void main(String[] argv) {
        System.out.println("Hello");
    }
}
```

A  Cannot be compiled, the compiler prints out a message about bad syntax
B  Can be compiled but not executed, since main cannot be in an interface
C  Can be compiled and prints out Hello, since static methods can be in interfaces
• What is printed out

```java
public enum Test {
    RED, GREEN, BLUE;

    public static void main(String[] argv) {
        System.out.println("Hello");
    }
}
```

A  Cannot be compiled, the compiler prints out a message about bad syntax
B  Can be compiled but not executed, since main cannot be in an enum
C  Can be compiled and prints out Hello