

## Searching/Sorting

### **What To Do:**

Follow each step carefully. After finishing, please submit your work, as a ZIP, to Canvas, and let one of the TAs know.

## Questions

1. Recall the sorting algorithms from lecture. In the starter code for today's lab is a dictionary of almost 500,000 words. The problem is that this dictionary was destroyed and shuffled by a hacker. Your job is to implement the generic static `mySort` method, which returns a list of the sorted strings.

In this lab you will primarily work with Java's `main` method. There are no associated JUnit tests.

- (a) First, read the file into a list and sort it using `mySort`. You can use any of the four sorting algorithms from the textbook/lecture, or another that you know of. Do **not** modify the input list. (Therefore, you should use a *functional* sorting algorithm.)

**Warning:** remember the analysis of the sorting algorithms from section 7.1. Insertion and selection sort grow, in the worst-case, quadratically. Merge and quick sort do not and are much faster. If your code isn't sorting the lists in under a second or so, then you need to use a different algorithm!

**Another Warning:** do **not** use code from any other source aside from the textbook. You cannot use ChatGPT/Google/any other means. Read section 6.2. If you do, you will receive a 0 on this lab.

- (b) Second, sort the list using the built-in `Collections.sort` method. This method *will* modify the input list.
- (c) Output (using `System.out.println`) the time difference, in milliseconds, between your method's sorting approach and Java's. How big of a difference is there?

*Hint: to compute the time elapsed before and after a method call, use the Java-provided method `System.currentTimeMillis()`.*

```
long before = System.currentTimeMillis();
callToSomeMethod();
long elapsed = System.currentTimeMillis() - before;
```

2. Recall the searching algorithms from lecture.

- (a) First, write the generic static `myBinarySearch` method, which receives the list and the key to search. The method should return the index of the string in the list, or `-1` if it does not exist.
- (b) Output (using `System.out.println`) the time difference, in milliseconds, between your version of binary search and Java's `Collections.binarySearch` method by searching for the string "computer". How big (or small) of a difference is there?