

INTRODUCTION TO COMPUTER SCIENCE I

PROJECT 5B

Divide and conquer, part I

1 Fancy sorting and searching

Go into your directory for Project 5, and then make a copy of your solution from part 5a:

```
$ cd project-5
$ cp SortIt.java FastSortIt.java
```

Use *Emacs* to open `FastSortIt.java`. Change the program name to match the file name:

```
public class FastSortIt {
```

Now change the methods that you wrote for 5a as follows:

- `public static int search (int[] array, int value)`
Re-write the body of this method to perform **binary search**. You may safely assume here that only sorted arrays are passed.
- `public static void sort (int[] array)` Re-write the body of this method to perform **mergesort**.

You are welcome to write any additional supporting methods for either or both of the above.

Running the program: Once again, `FastSortIt` program is run something like this:

```
$ java FastSortIt 100 -33
```

The program performs a number of steps:

1. It calls on a method in `Tools.class` to create an array of mostly random values; I say *mostly* because one of those values actually has a prescribed value. The length of this array is provided by the user at the command line.
2. It then calls on `sort()` to sort the array.
3. A `Tools` method is then used to verify that the sort is correct (printing error messages if it is not).
4. Finally, it uses `search()` to find the index of a particular value—one that the user gets to specify at the command line. The location of this value is then printed.

2 Finding a particular value

Use this program to find the position of the magic “Stone stone” value in 50 million entries. That is:

```
$ java FastSortIt 50000000 1814
```

[Again, 1814 is not the correct value.] Your program, although it will take a few moments to run, should find that value and show you the position number at which that value was found in the sorted array of 50 million values. **Hold onto that position number!**

3 Finding part C

To get to part C, visit the following link:

```
https://www.cs.amherst.edu/~sfkaplan/courses/fall-2012/COSC-111/  
projects/project-5c-XYZ.pdf
```

Of course, XYZ should be replaced with the position number at which the particular value, above, was found.

4 How to submit your work

Use the `cs111-submit` command:

```
cs111-submit project-5b FastSortIt.java
```

Project 5b is due on Nov 8/9, at the start of lab