

Home Exercise 3: Sorting

Algorithms and Complexity lecture
at Ecole Centrale Paris

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due: Monday, October 7, 2019

Abstract

Please send your solutions by email to Dimo Brockhoff (preferably in PDF format) with a clear indication of your full name until the submission deadline on October 7, 2019 (a Monday). Groups of **up to 4** students are explicitly allowed and even encouraged. In the case of group submissions, please make sure that you submit maximally four times with the same partner!

1 Insertion Sort with binary search (5 points)

Run the Insertion Sort algorithm with binary search on the following (integer) array:

503	87	512	61	908	170	897	275	653	426	154	509	612	677	765	703
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Please indicate how the array looks after each step. How many comparisons did the algorithm perform?

2 Mergesort (5 points)

Run the Mergesort algorithm on the same array from above and, similarly, show the array content after each step.

3 Finding the k largest elements with Mergesort (5+5 points)

1. How do you have to modify the Mergesort algorithm to find the k largest elements in an array?
2. What is the runtime of your algorithm if the array is of length n and the k is fixed beforehand (an upper bound on the asymptotic runtime is enough here)?