

Homework Assignment #3

CS 410/584 Algorithm Design & Analysis: Spring 2009

This assignment is due Wednesday, 22 April, at the beginning of class. You should work alone on this assignment. However, you are free to discuss the problems on the class mailing list. (Or you can send me or the TA email questions directly; please put “CS 584” at the beginning of the subject line.) Please put “410” or “584” on your paper, depending on which section you are registered in.

Reading: 17.1-17.3, 21 (all), 22.1-22.3, 22.5, 23 (all).

Note: On any homework exercise where you are asked to give an algorithm, you must also provide an English description of how it works and at least one example execution.

Exercises: 17.3-4 (10 points), 17.3-7 (10 points. You can assume only distinct elements are inserted. Also, it should be possible at any time to list the current set elements.), 22.1-6 (14 points), 22.2-6 (584 only, 10 points. Show two examples, one where there is a solution and one where there is not.)

3A (16 points): Show the UNION-FIND forest that results from the following sequence of operations on elements 1, 2, ..., 12. In the case of merging equal-size trees, make the tree with the smaller number at the root the root of the result.

Do this exercise two ways: without and with path compression.

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UNION(1, 5)
UNION(2, 8)
UNION(6, 5)
UNION(7, 2)
UNION(3, 4)
UNION(9, 5)
UNION(12, 10)
UNION(3, 10)
UNION(6, 3)
FIND(10)
UNION(10, 2)
FIND(8)
FIND(7)
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