

HOMEWORK 6 - DIVIDE & CONQUER

STUDY FOR THE MIDTERM!

PROBLEM 1 - FULL ALGORITHM DESIGN WRITE-UP

Haverford discovered in late August that some fake OneCards had been mixed in with the new ones they were planning to give the incoming first year students. Security knew that strictly less than half of them were fake and that the fake cards had incorrect access codes, while all the real cards had the same, correct, access code. The incorrect cards could have the same or different access codes. They had a machine that could check if two OneCards had the same access code (but the machine couldn't say what the code was).

Design an $O(n \log n)$ **divide-and-conquer** algorithm that would have helped Security to quickly find a single real OneCard to give a first-year arriving for an ID.

EXTRA CREDIT OPTION

Find an $O(n)$ solution to the above problem. It is ok if your extra credit solution is not divide and conquer. If you find an $O(n)$ **divide and conquer** solution, you may only do one write-up and receive the extra credit (since $O(n)$ is $O(n \log n)$). If you find an $O(n)$ solution that is **NOT** divide and conquer, you must do **TWO** full write-ups to receive extra credit.