Homework #4
Introduction to Algorithms/Algorithms 1
600.363/463
Spring 2014

Due on: Tuesday, February 25th, 5pm
Late submissions: will NOT be accepted
Format: Please start each problem on a new page.
Where to submit: On blackboard, under student assessment
Please type your answers; handwritten assignments will not be accepted.
To get full credit, your answers must be explained clearly,
with enough details and rigorous proofs.

February 18, 2014

1 Problem 1 (20 points)

Devise an algorithm which, given two length-n interger arrays A and B, returns a list C of all integers x that appear in both A and B. That is, C should be a list of all elements in the set

$$X = \{x : A[i] = x, B[j] = x \text{ for some } i, j1 \leq i \leq n, 1 \leq j \leq n\}.$$

Prove the correctness of your algorithm and prove its runtime. Your algorithm should run in time $O(n \log n)$ for full credit.

2 Problem 2 (20 points)

A binary array is one that contains only 0s and 1s. Devise an $O(n)$ time algorithm for sorting a binary array of length n. Prove the correctness of your algorithm and its runtime.

3 Optional Exercises

Solve the following problems and exercises from CLRS: 8.2, 9.2, 2.2, 2.3-5, 2.3-7.