CS 5633: Analysis of Algorithms

Homework 5

1. Suppose we are given two sorted arrays A and B which each contain n elements. Give an $O(\log n)$ time divide-and-conquer algorithm which finds the median of $A \cup B$.

2. The black-height of a red-black tree is the black-height of its root vertex.

   (a) What is the largest possible number of internal nodes in a red-black tree with black-height b?

   (b) What is the smallest possible number of internal nodes in a red-black tree with black-height b?

   Justify your answers.

3. For a red-black tree with just a black root node 5, consider insertions of 9, 3, 10, 8, 7, 6.

   Draw the sequence of trees obtained after each insertion.