

## Homework #2 (due in-class, November 3, 2016)

1. Work on (a) Exercise 6.4-1 (page 160), (b) Problem 7.1(a): Hoare partition (page 185) and Quick-sort discussed in class, and (c) Exercise 8.2-1 (page 196) based on the string (array of 14 characters): “*GOODALGORITHMS*”. Please mark the two *G*’s as  $G_1$  and  $G_2$ , and the three *O*’s as  $O_1$ ,  $O_2$ , and  $O_3$ , according to their orders in the input, and **show their positions during the processing**. For (c), assume you have only the 26 characters,  $A, B, \dots, Z$  and thus you may work on the array of the 26 characters.
2. Problem 6-3 (pages 167–168).
3. Exercise 8.2-4 (page 197).
4. (a) Exercise 8.3-1 (page 199); (b) Exercise 8.4-1 (page 204).
5. Problem 8-4 (pages 206–207).
6. Exercise 9.1-2 (page 215).
7. Exercise 9.3-8 (page 223.).
8. Exercise 9.3-9 (pages 223–224).
9. Exercise 12.2-1 (b) and (d) (page 293).
10. Problem 12-2 (page 304).
11. Figure 1 shows a binary tree with seven nodes.

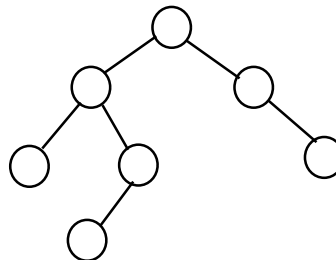


Figure 1: A binary tree.

- (a) Label the tree in Figure 1 with numbers from the set  $\{1, 2, 4, 5, 6, 7, 8\}$  so that it is a legal binary search tree.
- (b) Label each node in the tree with  $R$  or  $B$  denoting the respective colors RED and BLACK so that the tree is a legal red-black tree.
- (c) Make the left child of the root be the root by performing a single rotation. Draw the binary search tree that results, and label your tree with the keys from Part (a). Is it possible to label the nodes with colors so that the tree is a red-black tree? Justify your answer.
- (d) Give the red-black tree that results from inserting the key 3 into the tree in **Part (b)**.
- (e) Give the red-black tree that results from deleting the key 6 from the tree in **Part (b)**.

12. Problem 13-3 (page 333).
13. Exercise 15.1-5 (page 370).
14. Exercise 15.2-1 (page 378). (**If our October 27th's class does not cover Chapter 15.2, you can simply ignore this problem.** You must give tables as shown in Figure 15.5 of the text.)
15. (DIY Problem) For this problem, you are asked to design a problem *set* related to Chapter(s) 6–9, 12, 13, and/or 15 and give a sample solution to your problem set. Grading on this problem will be based upon the *quality* of the designed problem as well as the *correctness* of your sample solution.