CS 477/677 Analysis of Algorithms

Fall 2018

Homework 5

Due date: October 9, 2018

1. (U&G-required) [30 points]

(a) Exercise 6.3-1 (page 159).

(b) Exercise 8.2-1 (page 196).

2. (U&G-required) [20 points] Exercise 8.2-3 (page 196).

3. (U&G-required) [30 points] Implement in C/C++ an algorithm that checks if an array of *n* elements is a heap and determine its running time. The algorithm should print "YES, heap" or "Not a heap", depending on the outcome. Show how your algorithm works on the following arrays A = [16 14 10 8 7 9 3 2 4 1] and B = [10 3 9 7 2 11 5 1 6].

4. (U & G-required) [20 points] Exercise 6.3-2 (page 159).

5. (G-required) [20 points] Exercise 8.2-4 (page 197).

Extra credit:

6. [20 points]

(a) Find the smallest and the largest number of keys that a heap of height *h* can have.

(b) Prove that the height of a heap with n nodes is $\lfloor \log_2 n \rfloor$.