CS 477/677 Analysis of Algorithms

Fall 2018

Homework 4

Due date: October 2, 2018

For the programming problems below, include in your hardcopy submission a printout of your algorithm and of the output. Please follow attached submission instructions.

1. (U&G-required) [40 points]

Implement in C/C++ an algorithm to rearrange elements of a given array of *n* real numbers so that all its negative elements precede all its positive elements. Your algorithm should be both time- and space-efficient. Show how your algorithm works on the following input: A = [4 3 -2 0 2 9 -1 10 0 5 23 -4].

2. (U&G-required) [20 points] Answer the following question: is Quicksort a stable sorting algorithm? If yes, give a justification. If not, provide a counterexample.

3. (U & G-required) [20 points]

(a) [10 points] Exercise 7.1-1 (page 173).

(b) [10 points] Give an argument to show that RANDOMIZED-SELECT never makes a recursive call to a 0-length array.

4. (U & G-required) [20 points] Exercise 9.3-5 (page 223).

5. (G-required) [20 points] Exercise 9.2-4 (page 220).

Extra credit:

6. [20 points] Exercise 9.3-3 (page 223).