CS 477/677 Analysis of Algorithms

Fall 2019

Homework 4

Due date: October 3, 2019

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]

Consider the following problem: each of *n* visitors to a museum give their hand bags to the wardrobe attendant at the entrance. At the end of the day, the attendant gives the hand bags back to customers in random order. Use an indicator random variable to compute the expected number of visitors who get back their own bag.

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).