CMSC351 (Kruskal) Homework 1 Due: Friday, February 9, 2018

Problem 1. Assume that you have an array of values. The maximum contiguous sum may occur more than once. Give a linear time algorithm to determine if it does. NOTE: Two sequences forming the maximum contiguous sum may overlap.

Problem 2. Assume that you are sorting an array of size n using Bubble Sort, where $n = k(k+1)/2$. Assume that the smallest element is in the first location. The next two smallest elements are in the next two locations in some order. The next three smallest elements are in the next three locations in some order. Etc. For example, assume $n = 10$ (and $k = 4$), the input might look like

10, 30, 20, 50, 60, 40, 80, 100, 90, 70

The algorithm does not know this, and executes without this extra information.

(a) Assume each of the above groups is in reverse order. For example, if $n = 10$ (and $k = 4$), the input will look like

10, 30, 20, 60, 50, 40, 100, 90, 80, 70

What is the number of exchanges? Get the exact answer as a function of k, and the exact high order term as a function of n. Show your work.

(b) Assume each of the above groups is in random order. What is the average number of exchanges? Get the exact answer as a function of k, and the exact high order term as a function of n. Show your work.