Algorithms on Sequences

1. Suppose you are given a sequence of n numbers, where the ith number is

the amount of rainfall on the ith day. Given a number M, we want to find

the minimum number of consecutive days such that the total rainfall on

those days is at least M. In other words, find the shortest consecutive

subsequence of the given sequence such that the sum of the numbers is at

least M. Show how this can be done in O(n) time.

2. Consider a sequence a\_0, a\_1, a\_2, ..., a\_{n-1} of numbers. Given a number

K, 1 <= K <= n, we want to find a consecutive subsequence of length K

such that the smallest number in the subsequence is as large as possible.

In other words, find the index i for which the minimum number in

a\_i, a\_{i+1},..., a\_{i+K-1} is as large as possible. Show how this can

be done in O(n) time.

3. Given two sequences of lengths n and m, describe an O(n(n+m)) time algorithm

to find the total number of common subsequences.