

The following problems refer to the maximum contiguous sum problem. The pseudo-code for each of the three algorithms covered in class is on the class webpage under Class Resources.

Problem 1. Consider the problem of not only finding the value of the maximum contiguous sum in an array, but also determining the two endpoints.

- (a) Give a linear time algorithm for solving this problem. If there is more than one sum with the maximum value, find a longest such sum (i.e., a sum with the most elements of the array A). Write the pseudo-code.
- (b) What is the output if all entries are negative?

Problem 2. Consider the algorithms from class for finding the maximum contiguous sum. Assume that it takes time x to execute the instruction

$$S \leftarrow S + A[x]$$

- (a)
 - i. Write a sum for exactly how much time the third algorithm (the linear algorithm) takes executing additions involving elements from the array A ? Do not justify.
 - ii. Simplify your sum. Do not justify.
- (b)
 - i. Write a sum for exactly how much time the second algorithm (the quadratic algorithm) takes executing additions involving elements from the array A ? Do not justify.
 - ii. Simplify your sum. Show your work.
- (c) **Challenge problem, will not be graded.** Exactly how much time does the first algorithm (the cubic algorithm) take executing additions involving elements from the array A ? Show your work.