

Homework 9

CS 3343 – Fall 2006
Tom Bylander, Instructor

assigned October 26, 2006
due November 10, 2006

Your solutions must be submitted as a document to WebCT.

1. (100 pts.) We want to write a dynamic programming algorithm that, given an array $A[0..n-1]$ of numbers, finds l and r so that the sum:

$$\sum_{i=l}^r A[i]$$

is a maximum. This will be accomplished by completing the following exercises.

- (a) (20 pts.) What is the solution for the following sequences?

$-9, -6, -8, -9, -9, -8, -4, -1, 8, 5, -7, 5, -2, -4, 6, 9, -5, 5, 6, 5$

$9, 0, 5, 7, 6, -6, -6, -4, 2, -4, -3, 8, -9, 6, -6, 8, 1, 5, 9, -4$

- (b) (20 pts.) Suppose we want $B[i]$ be the maximum sum when $r = i$ and $C[i]$ to be the value of l when $r = i$. What value should be assigned to $B[0]$ and $C[0]$? What value should be assigned to $B[i]$ and $C[i]$ when $i \geq 1$? Hint: How can $B[i]$ and $C[i]$ be efficiently computed from $B[i-1]$, $C[i-1]$ and A ?
- (c) (20 pts.) Prove that your solution to the previous problem computes the maximum sum when $r = i$ correctly.
- (d) (20 pts.) In pseudocode, write the dynamic programming algorithm solving this problem.
- (e) (20 pts.) What is the time efficiency of your algorithm? Justify your answer. What is the basic operation and the basic operation count?