CS140: Algorithms

Fall 2000

Assignment 7

This assignment is due by 5 PM on Fri., Oct. 20. You may collaborate with your classmates to complete this assignment but you must reference your collaborators. In addition, you must do your own write-up. This assignment is worth 100 points (50 points if handwritten). Your answers will be judged for clarity, conciseness, and correctness. You algorithms and bounds should be, respectively, as fast and as tight as possible.

1. Problem 16-2 on page 325 of the text but modify the cost criterion to read: "We wish to minimize the sum, over all lines, of the cubes of the numbers of extra space characters at the ends of lines." (This makes the problem slightly easier.) We'll denote this minimum sum for the first i words as $C(i)$.

   Before you describe and analyze your dynamic programming algorithm, give an inductive definition of the cost function $C(i)$. Hint: How many words can possibly be printed on the last line?

2. Problem 16-3 on page 325 of the text but restrict the edit operations to copy, insert, delete, and substitute. Further assume that cost(copy)= 0, cost(insert)=cost(delete)=2 and cost(substitute)= 3. Before you describe and analyze your dynamic programming algorithm, give an inductive definition of the edit distance $D(x_1, \ldots, x_m; y_1, \ldots, y_n)$. Hint: You'll find this problem is similar (but not identical) to Longest Common Subsequence.