

Exercises 4

*Handed Out: May 13**Due: May 20*

1. What is the optimal way to compute $A_1A_2A_3A_4A_5$, where the dimension of A_1 is 10×4 , the dimension of A_2 is 4×5 , the dimension of A_3 is 5×20 , the dimension of A_4 is 20×2 , and the dimension of A_5 is 2×50 ? Show the final parenthesizing for the matrix chain multiplication.
2. Suppose you are told the daily closing price for the Dow Jones Index for the **last** n **days**. Your goal is to identify the **longest growing subsequence** of days where on each day the closing price is higher than the previous day in the subsequence. For example, if the input sequence is

$$\langle 8, 3, 12, 5, 31, 11, 19, 1, 81, 6 \rangle,$$

then the longest growing subsequence is

$$\langle 3, 5, 11, 19, 81 \rangle.$$

Propose (and analyze) an $O(n^2)$ time algorithm for this problem.

3. Given three strings A , B , and C , you want to find the *longest subsequence* that is common to *all* three strings. Give a polynomial time algorithm for this problem. Present the pseudo-code for your algorithm in the manner of longest common subsequence for two strings discussed in the class. Discuss the worst-case time complexity of your algorithm.