

After Lecture 15 & 16 – Answer any questions on HW4 (due today)
Practice Problems (all taken from previous exams)

1. In dynamic programming, the technique of storing the previously calculated values is called

 - a) Saving value property
 - b) Storing value property
 - c) Memoization
 - d) Mapping
2. What is the time complexity of the brute force algorithm used to find the longest common subsequence for sequence length m and sequence length n ($m < n$)?
 - a) $O(mn)$
 - b) $O((mn)^2)$
 - c) $O(n2^m)$
 - d) $O(2^m 2^n)$
3. When dynamic programming is used, it takes less time compared to algorithmic methods that don't utilize overlapping subproblems.
 - a) True.
 - b) False.
4. Using the dynamic programming solution, determine an LCS of $\{1, 0, 0, 1, 0, 1, 0, 1\}$ and $\{0, 1, 0, 1, 1, 0, 1, 1, 0\}$. Show all your work.
5. Given a sequence of n numbers $a_1, a_2, a_3, \dots, a_n$ (some of them might be negative) stored in an array, we want to find two indices $i \leq j$ such that the sum of the numbers from a_i to a_j is maximum, among all possible i, j pairs $1 \leq i \leq j \leq n$.
 - 5a) Write pseudocode to sum each contiguous subsequence (from a_i to a_j) and keep track of the maximum one. What is the runtime of your algorithm?
 - 5b) Now find an $O(n)$ algorithm. Give pseudocode.
6. Prove that a binary tree that is not full (every node has 0 or 2 children) cannot correspond to an optimal prefix code.