

CSCI B505 – Fall 2018

Programming Assignment 4: Due online October 14 , 2018, 11:59pm EST.

What to turn in: Solve the following problem using Dynamic Programming. Please submit your code. In a separate PDF file, describe in your own words how you solved the problem (i.e., clearly mention the subproblems and how the dynamic programming table helped you achieve the solution). You are encouraged to consult the bottom-up approach described in Chapter 15.4 of the textbook.

The problem: given two sequences $X = \langle x_1, x_2, \dots, x_m \rangle$ and $Y = \langle y_1, y_2, \dots, y_n \rangle$, find a maximum-length common subsequence of X and Y . Your program should run in $\mathcal{O}(mn)$.

For example, if $X = \langle A, B, C, B, D, A, B \rangle$ and $Y = \langle B, D, C, A, B, A \rangle$, then the sequence $\langle B, C, B, A \rangle$ is a maximum-length common subsequence of X and Y .

For the formal definitions of *subsequence* and *common subsequence* refer to CLRS page 391. You can implement the algorithm that is described in CLRS, section 15.4.

Sample input/outputs: Here there are some test cases which you can use to test the correctness of your algorithm:

- Test #1
inputs:
 $X = \langle A, B, C, B, D, A, B \rangle$
 $Y = \langle B, D, C, A, B, A \rangle$
a valid output: $\langle B, C, B, A \rangle$
another valid output: $\langle B, D, A, B \rangle$
- Test #2
inputs:
 $X = \langle 1, 0, 0, 1, 0, 1, 0, 1 \rangle$
 $Y = \langle 0, 1, 0, 1, 1, 0, 1, 1, 0 \rangle$
a valid output: $\langle 1, 0, 1, 0, 1, 0 \rangle$
another valid output: $\langle 0, 1, 0, 1, 0, 1 \rangle$
yet another valid output: $\langle 1, 0, 1, 1, 0, 1 \rangle$