COP 3503 Honors – Homework 4 (Non-Collaborative)

Due Date: October 2, 2025

1. A palindrome is nonempty string over some alphabet that reads the same forwards and backwards. Example palindromes include `civic, racecar, aibohphobia` (fear of palindromes). Give an efficient dynamic programming algorithm to find the longest palindrome that is a subsequence of a given input string. For example, given the input string `character`, your algorithm would return `carac`. Another example is the input string BBABCBCAB. Your algorithm would return BABCBAB. In order to receive full credit, you cannot use longest common subsequence (LCS) in your solution.

   You should devise your solution into 5 parts.
   a.) (5 pts) Characterize a longest palindrome subsequence
   b.) (5 pts) Define a recursive solution
   c.) (5 pts) Compute the length of a longest palindrome subsequence (Give pseudocode for a function called `Longest-Palindrome`.
   d.) (5 pts) Construct a longest palindrome subsequence (Give pseudocode for a function called `Generate-LPS`)
   e.) (5 pts) Give the running time for your algorithm.

2. (25 pts) Implement your solution to problem 1. You should provide a listing of your code as well as example inputs and outputs to show it is working. You should test your solution on at least 10 input strings that have and do not have palindromes. Here are some examples:

   Madam
   Repaper
   Wow
   Red rum, sir, is murder
   No lemon, no melon
   Kanakanak
   Aibohphobia
   Civic
   Racecar
   Character
   Are we not pure? “No, sir!” Panama’s moody Noriega brags. “It is garbage!” Irony dooms a man—a prisoner up to new era.