Assignment 4 CSCI4041

DUE: Sunday, November 6, 10:00pm (+1hr55min grace period) Fall 2016

***IF YOUR ASSIGNMENT IS NOT ACCEPTED BY TURNITIN BECAUSE IT DOES NOT CONTAIN 120+ WORDS OF DIGITAL TEXT, 3 POINTS WILL BE DEDUCTED FROM YOUR HOMEWORK.***

**1. Constructing Solutions After Calculating Optimal Cost (15.4-2)**

Give pseudocode to reconstruct an LCS from the completed c table and original sequences X = <x1, x2, …, xm> and Y = < y1, y2, …, yn> in O(m+n) time, without using the b table.

**2. Editing Distance (version of 15-5)**

Write a polynomial time algorithm to calculate optimal cost (minimal editing distance) between 2 strings, as described in problem 15-5. However, use only the operators Delete, Insert, and Twiddle. This can be iterative or recursive. State the runtime with a brief justification.

**3. Modified Activity Selection**

Consider a modification to the activity-selection problem in which each activity ai has, in addition to a start and finish time, a value vi. The objective is no longer to maximize the number of activities scheduled, but instead to maximize the total value of the activities scheduled. Give a polynomial-time algorithm for this problem. Justify the runtime.

**4. Optimal Substructure**

Consider the problem of given a set { x1, x2, …, xn } of points on the real line, determine the smallest set of unit-length closed intervals that contains all of the given points. Prove that this problem exhibits optimal substructure.

**5. Greedy Choice Property**

Suppose you are given two sets A and B, each containing n positive integers. You can choose to reorder each set however you like. After reordering, let ai the ith element of set A, and let bi be the ith element of set B. You then receive a payoff of 𝚷 { i over 1 to n } ai^bi. Prove that the greedy choice property holds for this algorithm.