CSCI 570 - Fall 2019 - HW 7

Due October 23th 11:59 p.m.

1   Graded Problems

Question 1

Suppose you have a DAG with costs $c_e > 0$ on each edge and a distinguished vertex s. Give a dynamic programming algorithm to find the most expensive path in the graph that begins at s. Prove your algorithms runtime and correctness. For full credit, your algorithms runtime should be linear.

Question 2

A palindrome is a string that reads the same forwards and backwards. Suppose we are given a string $S = s_1 s_2 s_3 ... s_n$, and we want to find the longest palindrome that can be formed by deleting some characters from the string. Give an efficient dynamic programming algorithm to solve this problem. Prove its running time and correctness. For full credit, your algorithm should output which character(s) to delete to form the longest palindrome.

Question 3

Suppose you are in Casino with your friend, and you are interested in playing a game against your friend by alternating turns. The game contains a row of n coins of values $v(i)$, where n is even. In each turn, a player selects either the first or last coin from the row, removes it from the row permanently, and receives the value of the coin. Determine the maximum possible amount of money you can definitely win if you move first.

Question 4

Given a rod of length n inches and an array of prices that contains prices of all pieces of size smaller than n. Determine the maximum value obtainable by cutting up the rod and selling the pieces.