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

Given a sequence $a1, a2, ..., an$ of n numbers, describe an $O(n^2)$ algorithm to find the longest monotonically increasing sub-sequence.

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.

2 Practice Problems

1. Solve Kleinberg and Tardos, Chapter 6, Exercise 5.

2. Solve Kleinberg and Tardos, Chapter 6, Exercise 12.

3. Solve Kleinberg and Tardos, Chapter 6, Exercise 20.