Date: Apr 10, 2023

Question-1

The nth Tribonacci number T(n) is defined as: $T(n) = T(n-1) + T(n-2) + T(n-3)$, with $T(0) = 0$, $T(1) = T(2) = 1$. Calculate the value of $T(5)$ using 1) recursion 2) memoization 3) dynamic programming, and state the number of steps in each case.

Question-2

You are given a bag of capacity 16kg. There are some objects whose weights are given by W = {7, 3, 5, 8} and profits are given by P = {7, 4, 6, 9}. Objects are indivisible. What objects should be picked such that maximum profit can be obtained? Solve using 1) greedy approach 2) dynamic programming. Which gives more optimal result and why?
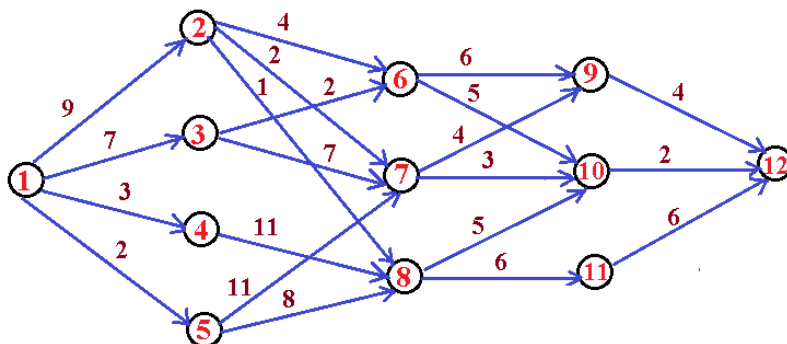

Question-3

5 matrices are given with dimensions A1(4x10), A2(10x3), A3(3x12), A4(12x20) and A5(20x7). In which order must they be multiplied such that the total cost of multiplication is minimized?

Question-4

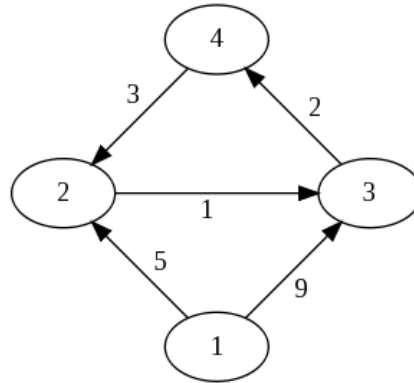Find the longest common subsequence of the two strings "acbaed" and "abcadf" using dynamic programming.

Question-5

Find the maximum cost it takes to travel from the source to the destination in the following multistage graph:

Question-6

Find the shortest distance between all path pairs in the following graph:

Question-7

There are 5 numbers provided – {2, 9, 3, 6, 1}. Each of them is searched for multiple times – the frequency array is given as – {4, 6, 1, 4, 5}. Construct a binary search tree such that the total cost of searching the elements is minimized.

Question-8

An ant is standing at vertex a. It wants to traverse all vertices exactly once and then return to the start vertex. Identify the path it should take to travel with minimum cost.