GeeksQuiz

Computer science mock tests for geeks

Dynamic Programming

Question 1

Which of the following standard algorithms is not Dynamic Programming based.

A Bellman–Ford Algorithm for single source shortest path

B Floyd Warshall Algorithm for all pairs shortest paths

C 0-1 Knapsack problem

D Prim's Minimum Spanning Tree

Discuss it

Question 2

We use dynamic programming approach when

A It provides optimal solution

B The solution has optimal substructure

C The given problem can be reduced to the 3-SAT problem

D It's faster than Greedy

Discuss it

Question 3

An algorithm to find the length of the longest monotonically increasing sequence of numbers in an array A[0 :n-1] is given below. Let Li denote the length of the longest monotonically increasing sequence starting at index i in the array.

Initialize $L_{n-1} = 1$
For all i such that $0 \leq i \leq n-2$
$L_i = \begin{cases} 1 + L_{i+1} & \text{if } A[i] < A[i+1] \\ 1 & \text{Otherwise} \end{cases}$
Finally the length of the longest monotonically increasing sequence is $\text{Max}(L_0, L_1, \ldots, L_{n-1})$.

Which of the following statements is TRUE?

A The algorithm uses dynamic programming paradigm

B The algorithm has a linear complexity and uses branch and bound paradigm

C The algorithm has a non-linear polynomial complexity and uses branch and bound paradigm

D The algorithm uses divide and conquer paradigm.

Discuss it

Question 4

Kadane algorithm is used to find:

A Maximum sum subsequence in an array

B Maximum sum subarray in an array

C Maximum product subsequence in an array

D Maximum product subarray in an array

Discuss it

Question 5

Four matrices M1, M2, M3 and M4 of dimensions pxq, qxr, rxs and sxt respectively can be multiplied is several ways with different number of total scalar multiplications. For example, when multiplied as ((M1 X M2) X (M3 X M4)), the total number of multiplications is pqr + rst + prt. When multiplied as (((M1 X M2) X M3) X M4), the total number of scalar multiplications is pqr + prs + pst. If p = 10, q = 100, r = 20, s = 5 and t = 80, then the number of scalar multiplications needed is

A 248000

B 44000

C 19000

D 25000

Discuss it

Question 6

The subset-sum problem is defined as follows. Given a set of n positive integers, S = {a1 ,a2 ,a3 , …,an} and positive integer W, is there a subset of S whose elements sum to W? A dynamic program for solving this problem uses a 2-dimensional Boolean array X, with n rows and W+1 columns. X[i, j],1 <= i <= n, 0 <= j <= W, is TRUE if and only if there is a subset of {a1 ,a2 ,...,ai} whose elements sum to j. Which of the following is valid for 2 <= i <= n and ai <= j <= W?

A X[i, j] = X[i - 1, j] V X[i, j -ai]

B X[i, j] = X[i - 1, j] V X[i - 1, j - ai]

C X[i, j] = X[i - 1, j] V X[i, j - ai]

D X[i, j] = X[i - 1, j] V X[i -1, j - ai]

Discuss it

Question 7

In the above question, which entry of the array X, if TRUE, implies that there is a subset whose elements sum to W?

A X[1, W]

B X[n ,0]

C X[n, W]

D X[n -1, n]

Discuss it

Question 8

A sub-sequence of a given sequence is just the given sequence with some elements (possibly none or all) left out. We are given two sequences X[m] and Y[n] of lengths m and n respectively, with indexes of X and Y starting from 0. We wish to find the length of the longest common sub-sequence(LCS) of X[m] and Y[n] as l(m,n), where an incomplete recursive definition for the function l(i,j) to compute the length of The LCS of X[m] and Y[n] is given below:

```
l(i,j) = 0, if either i=0 or j=0
       = expr1, if i,j > 0 and X[i-1] = Y[j-1]
       = expr2, if i,j > 0 and X[i-1] != Y[j-1]
```

A expr1 ≡ l(i-1, j) + 1

B expr1 ≡ l(i, j-1)

C expr2 ≡ max(l(i-1, j), l(i, j-1))

D expr2 ≡ max(l(i-1,j-1),l(i,j))

Discuss it

Question 9

Consider two strings A = "qpqrr" and B = "pqprqrp". Let x be the length of the longest common subsequence (not necessarily contiguous) between A and B and let y be the number of such longest common subsequences between A and B. Then x + 10y = ___.

A 33

B 23

C 43

D 34

Discuss it

There are 9 questions to complete.