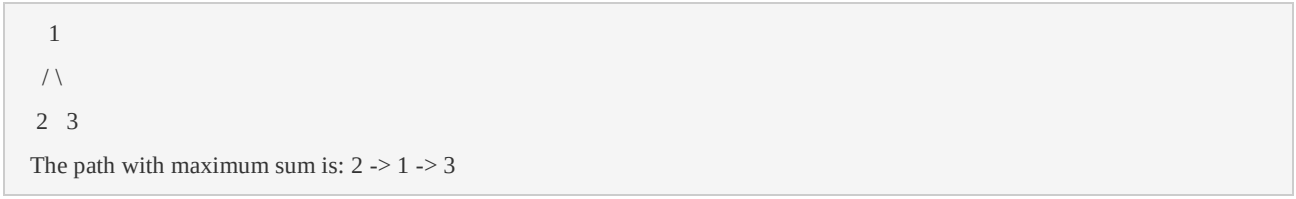
19CSE302-Design and Analysis of Algorithms
Assignment – Dynamic Programming
Marks -20
Date:-28/10/2021
Submission time:- 29/10/2021 1:10 PM

Q1: Given two strings **A** and **B**, find the **minimum** number of steps required to convert **A** to **B**. Each operation is counted as 1 step and you have the following 3 operations permitted on a word:
Insert a character
Delete a character
Replace a character
Example: A = "abad" and B = "abac".
Min steps required =1
Explanation: After applying operation: Replace d with c. We get A = B.
Example 2: A = "Anshuman" and B = "Antihuman"
Min steps required = 2.
Explanation: After applying operations: Replace s with t and insert i before h. We get A = B.

For the given problem:

(a) Identify the subproblem with explanation. (2M)
(b) Identify the recurrence relation with base condition. (3M)
(c) Provide the pseudocode for the Dynamic problem based algorithm. (3M)
(d) Identify and explain the how DP is improving the complexity of the problem from typical brute force solution. (2M)

Q2: Given a binary tree **T**, find the maximum path sum. The path may start and end at any node in the tree. As an input you are provided the root pointer of the tree.



For the given problem:

(a) Identify the subproblem with explanation. (2M)
(b) Identify the recurrence relation with base condition. (3M)

(c) Provide the pseudocode for the Dynamic problem based algorithm. (3M)
(d) Identify and explain the how DP is improving the complexity of the problem from typical brute force solution. (2M)