
NOTE: Please write down the subproblem, recurrence equation and the time complexity. Briefly explain why.

Problem 1 Transform String (5 pts)

Given two strings s_1 and s_2 , find out the minimum operations so that transform s_1 to s_2 .

You can use 3 operations as following:

1. insert
2. delete
3. replace

For example, $s_1 = \text{"hors"}$, $s_2 = \text{"rose"}$, the output is 3, $\text{"hors"} \rightarrow (\text{replace}) \text{"rors"} \rightarrow (\text{delete}) \text{"ros"} \rightarrow (\text{insert}) \text{"rose"}$. (The order of the operations is not important)

Problem 2 (5 pts)

Gezi Wang and his friends are going mountain climbing! There are K people, and each of them carries a bag. These packages have the same capacity W . There are N types of items and each type i has a given weight w_i and value v_i . In Gezi Wang's view, a reasonable backpack arrangement would look like this:

1. There can only be at most one item of each type in each bag, but the item of the same type can exist in different bags.
2. The total weight of items in each person's backpack is **exactly the same as the capacity of the bag**.
3. Any two people can't have exactly the same lists of things in their bags.

Assume there are plenty of lists to satisfy the requirement. Find an efficient algorithm to determine the maximum total value of all items in all bags, given the above requirements.