

Google Interview Problems (Set 2)

1) Given two words (start and end), and a dictionary, find the shortest transformation sequence from start to end, such that:

Only one letter can be changed at a time

Each intermediate word must exist in the dictionary

If there are multiple such sequence of shortest length, return all of them. Refer to the example for more details.

Note:

- a) All words have the same length.
- b) All words contain only lowercase alphabetic characters.

Input Format:

The first argument is string start.

The second argument is string end.

The third argument is an array of strings dict.

Output Format:

Return all transformation sequences such that first word of each sequence is start and last word is end, all intermediate words belongs to dictionary(dict) and consecutive words had at most 1 difference.

Example:

start = "hit"

end = "cog"

dict = ["hot", "dot", "dog", "lot", "log"]

Return

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[["hit", "hot", "dot", "dog", "cog"], ["hit", "hot", "lot", "log", "cog"]]
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2) Given n points on a 2D plane, find the maximum number of points that lie on the same straight line.

Sample Input:

(1, 1)

(2, 2)

Sample Output:

2

You will be given 2 arrays X and Y. Each point is represented by (X[i], Y[i]).

3) Write a function Brackets (int n) that prints all combinations of well-formed brackets.

For Brackets (3) the output would be ((())), (()()), ()()(), ()()(), ()()()

4) Given a paper of size A x B. Task is to cut the paper into squares of any size. Find the minimum number of squares that can be cut from the paper.

Examples:

Input 1: 36 x 30

Output 1: 5

Explanation 1:

3 (squares of size 12x12) +

2 (squares of size 18x18)

Input 2: 4 x 5

Output 2: 5

Explanation 2:

1 (squares of size 4x4) +

4 (squares of size 1x1)

5) Consider a row of n coins of values $v_1 \dots v_n$, where n is even. We play a game against an opponent by alternating turns. 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 we can definitely win if we move first.

Note: The opponent is as clever as the user.

Let us understand the problem with few examples:

1. 5, 3, 7, 10: The user collects maximum value as $15(10 + 5)$

2. 8, 15, 3, 7: The user collects maximum value as $22(7 + 15)$

Does choosing the best at each move give an optimal solution?

No. In the second example, this is how the game can finish:

1.

.....User chooses 8.

.....Opponent chooses 15.

.....User chooses 7.

.....Opponent chooses 3.

Total value collected by user is $15(8 + 7)$

2.

.....User chooses 7.

.....Opponent chooses 8.

.....User chooses 15.

.....Opponent chooses 3.

Total value collected by user is $22(7 + 15)$

So, if the user follows the second game state, maximum value can be collected although the first move is not the best.

6) Given an array in which all numbers except two are repeated once. (i.e. we have $2n+2$ numbers and n numbers are occurring twice and remaining two have occurred once). Find those two numbers in the most efficient way.

Example:

Input: {4, 6, 7, 8, 4, 7}

Output: {6, 8}