Q5. Two-Opt Swaps (40 marks):

There are 8 nodes in a graph, namely, **a**, **b**, **c**, **d**, **e**, **f**, **g**, and **h**, respectively. An ant wants to travel from node **a**, through every other node once, and then come back to node **a**. The original route is as shown below

a→b→c→d→e→f→g→h→a

This route can be represented by a sequence of characters **abcdefgha**.

Suppose now the ant decides to reverse its local route between two intermediate nodes, say **b** and **e**, then the new route will be

a→e→d→c→b→f→g→h→a

Or, it can be represented by a sequence of characters **aedcbfgha**.

The above process is called a 2-opt swap.

After getting the new route, the ant might not be happy yet. Then it can further perform another iteration of 2-opt swap.

For instance, now the ant decides to further reverse its local route between **g** and **d** from the route **aedcbfgha**, then the new route will be

a→e→g→f→b→c→d→h→a

That is, the final result of the two iterations of 2-opt swaps will then be **aegfbcdha**.

The ant can continuously perform multiple iterations of 2-opt swaps until it is happy with the final route.

Write a program to

Input, in sequence,

- The number of 2-opt swaps the ant likes to perform before its trip. Note that this number is a positive integer not greater than 4.
- Pairs of characters, and each pair represents the two distinct intermediate nodes to perform a 2-opt swap.

Output the sequence of nodes after performing the last 2-opt swap.

试题 5. 2-Opt 交换（40 marks）：

一个图中有 8 个节点，分别是 **a**、**b**、**c**、**d**、**e**、**f**、**g** 和 **h**。一只蚂蚁想从节点 **a** 出发，穿过其他节点各一次，然后再回到节点 **a**。原路线如下图所示

a→b→c→d→e→f→g→h→a

这条路线可以用字符序列 **abcdefgha** 来表示。

假设现在蚂蚁决定在两个中间节点 **b** 和 **e** 之间反转它的本地路径，那么新的路线将是

a→e→d→c→b→f→g→h→a

这个新路线也可以用字符序列 **aedcbfgha** 来表示。

上述过程称为 **2-opt 交换**。

得到新路线后，蚂蚁可能还不高兴。然后它可以进一步执行 2-opt 交换产生另一个新路径。

例如，现在蚂蚁决定从路线 **aedcbfgha** 进一步反转它在 g 和 d 之间的本地路径，那么新路线将是

a→e→g→f→b→c→d→h→a

也就是说，两个迭代的 2-opt 交换之后，最终结果将是 **aegfbcdha**。

蚂蚁可以连续执行多次 2-opt 交换迭代，直到它对最终的路线感到满意为止。

试写一程式以

依序输入

- 蚂蚁在出发前想要执行 2-opt 交换的次数。请注意，此数字是一个不大于 4 的正整数。
- 每一次执行 2-opt 交换的两个中间节点的字符。

输出执行最后一次 2-opt 交换后的节点字符序列。

Test Cases

Input (输入)	Output (输出)
2 be gd	aegfbcdha
3 cg bf ch	afgbedhca
1 dh	abchgfeda
4 eh bd ce hg	adefhgbca
2 bf gc	afedgbcha

Input (输入)	Output (输出)
3 be gd fc	aegcbfdha
2 hc eg	abhefgdca
1 gc	abgfedcha