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Task: POC

Trains



Stage II. Day 1. Source file poc.*

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Available memory: 128 MB.

The Trains of Colour Parade begins tomorrow in Byteotia. Intense preparations are already in progress at the station's auxiliary tracks. There are n parallel tracks at the station, numbered from 1 to n . The train no. i occupies the i^{th} track. Every train consists of l cars and each car is painted with one of 26 colours (denoted by non-capital letters of the English alphabet). We say that two trains *look the same*, if their corresponding cars are painted the same colour.

Throughout the parade a crane will switch places of certain pairs of cars. The real parade, however, will take place tomorrow. Today the train dispatcher, Byteasar, watched the general rehearsal closely. He even wrote down the sequence of car swaps.

Byteasar particularly dislikes many trains looking the same. For each train p he would like to calculate the maximum number of trains that at some moment look the same as the train p at the very same moment.

Task

Write a programme that:

- reads descriptions of the trains occupying tracks and the sequence of car swaps,
- for each train determines the maximum number of trains that look the same as it at certain moment,
- writes out the result.

Input

The first line of the input contains three integers n , l and m ($2 \leq n \leq 1000$, $1 \leq l \leq 100$, $0 \leq m \leq 100000$), denoting respectively the number of trains, their common length and the number of car swaps. The following n lines contain descriptions of the trains on successive tracks. The k^{th} line consists of l small letters of the English alphabet denoting the colours of successive cars of the k^{th} train. Then m lines describing the car swaps follow, in the order of the swaps. The r^{th} line contains four integers p_1, w_1, p_2, w_2 ($1 \leq p_1, p_2 \leq n$, $1 \leq w_1, w_2 \leq l$, $p_1 \neq p_2$ or $w_1 \neq w_2$) denoting the r^{th} car swap—the car no. w_1 of the train no. p_1 is swapped with the car no. w_2 of the train no. p_2 .

Output

Your programme should write out exactly n lines. The k^{th} line should contain one integer—the number of trains looking the same as the train no. k at certain moment.

Example

For the input data:

5 6 7
ababbd
abbbbd
aaabbd
caabbd
cabaad
2 3 5 4
5 3 5 5
3 5 2 2
1 2 4 3
2 2 5 1
1 1 3 3
4 1 5 6

the correct result is:

3