

DMPG '19 S4 - Confusing Crossword Conundrum

Time limit: 2.5s **Memory limit:** 128M

Bob is trying to solve a crossword puzzle, but he doesn't have the patience to do it. So naturally, he wants you to write a program to help him.

Bob has compiled a list of N distinct **valid** words and M unordered pairs of **synonyms** from that list. The **distance** between words x and y is the length of the shortest sequence of words w_1, w_2, \dots, w_k such that $w_1 = x$, $w_k = y$, and w_i and w_{i+1} are synonyms for all $1 \leq i < k$. If no such sequence exists, the words are **unrelated**; otherwise, they are **related**.

In the puzzle, Bob is given Q clues of the form `a b`, where `a` is a valid word and `b` is an uppercase English letter. The answer to each clue is the word that has the **shortest distance** from `a`, of all the valid words starting with `b` that are related to `a`. If none of the words starting with `b` are related to `a`, there is **no answer**. If multiple answers are possible, the correct one is the **lexicographically lowest** of them.

Please help Bob solve the puzzle!

Constraints

Subtask 1 [25%]

$$2 \leq N \leq 300$$

$$1 \leq M \leq 500$$

$$1 \leq Q \leq 300$$

Subtask 2 [25%]

$$2 \leq N \leq 2\,000$$

$$1 \leq M \leq 5\,000$$

$$1 \leq Q \leq 2\,000$$

Subtask 3 [50%]

$$2 \leq N \leq 100\,000$$

$$1 \leq M \leq 200\,000$$

$$1 \leq Q \leq 100\,000$$

Input Specification

The first line contains three space-separated integers, N , M , and Q .

The next N lines each contain one string consisting of no more than 10 uppercase English letters, the i -th valid word.

The next M lines each contain two distinct space-separated strings, a pair of synonyms. Each pair appears at most once.

The final Q lines each contain one valid word followed by one uppercase English letter, the i -th clue.

Output Specification

Q lines. The i -th line should contain one valid word—the answer to the i -th clue—or `-1` if there is no answer. If there are multiple valid answers, output the lexicographically lowest one.

Sample Input

```
6 4 4
AA
AB
AC
CCC
BBB
EA
AA CCC
AB BBB
AC CCC
CCC BBB
BBB A
BBB B
CCC A
BBB E
```

Sample Output

```
AB
BBB
AA
-1
```