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, \ldots, w_k such that $w_1 = x$, $w_k = y$, and w_i and w_{i+1} are synonyms for all $1 \le i < k$. If no such sequence exists, the words are **unrelated**; otherwise, they are **related**.

In the puzzle, Bob is given Q clues of the form \boxed{a} \boxed{b} , where \boxed{a} is a valid word and \boxed{b} is an uppercase English letter. The answer to each clue is the word that has the **shortest distance** from \boxed{a} , of all the valid words starting with \boxed{b} that are related to \boxed{a} . If none of the words starting with \boxed{b} are related to \boxed{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 < N < 300

1 < M < 500

 $1 \le Q \le 300$

Subtask 2 [25%]

2 < N < 2000

1 < M < 5000

 $1 \le Q \le 2000$

Subtask 3 [50%]

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

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

 $1 \le Q \le 100\,000$

Input Specification

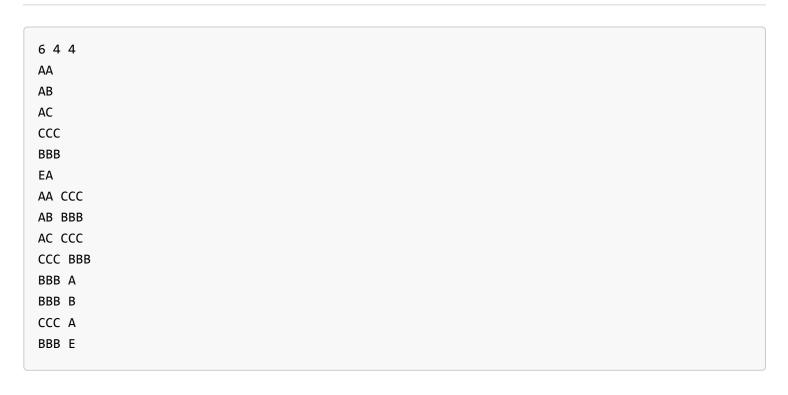
The first line contains three space-separated integers, N, M, and Q.

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



Sample Output

