Substring Queries



We define the following:

- A *substring* of a string is a contiguous segment of the string's characters. For example, the substrings of string "aka" are "a", "k", "a", "ak", "ka", and "aka".
- F(a,b) is the length of the longest substring of string a that occurs at least once as a substring of string b. For example, F("sadas", "faradast") is a because "adas" contains four characters and is the longest substring of a = "sadas" that is also a substring of a = "faradast".

Given an array of n strings, $s = [s_0, s_1, \ldots, s_n]$, you must answer q queries where each query j consists of x_j and y_j . For each query, find $F(s_{x_j}, s_{y_j})$ as quickly as possible and print the result on a new line.

Input Format

The first line contains two space-separated integers denoting the respective values of n (the number of strings) and q (the number of queries).

Each line i of the n subsequent lines contains a string denoting s_i .

Each line j of the q subsequent lines contains two space-separated integers describing the respective values of x_i and y_i for query j.

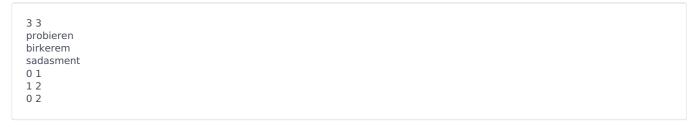
Constraints

- $1 \le n \le 5 \times 10^4$
- $1 \le q \le 10^5$
- $0 \leq x_j, y_j \leq n-1$
- $ullet \sum_{i=1}^n |s_i| \leq 10^5$
- It is guaranteed that each s_i consists of lowercase English alphabetic letters only.

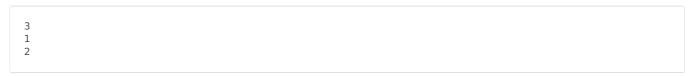
Output Format

Print q lines where each line j contains an integer denoting the result of $F(s_{x_j},s_{y_j})$.

Sample Input 0



Sample Output 0



Explanation 0

We perform the following q = 3 queries:

1. F("probieren", "birkerem"): The longest substring of "probieren" that is also a substring of

- "birkerem" is "ere", so we print its length (3) on a new line.
- 2. F("birkerem", "sadasment"): The only substrings of "birkerem" that are also substrings of "sadasment" are "e" and "m", but they both have the same maximal length. We then print their length (1) on a new line.
- 3. F("probieren", "sadasment"): The longest substring of "probieren" that is also a substring of "sadasment" is "en", so we print its length (2) on a new line.