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, $F(\texttt{"sadas"}, \texttt{"faradast"})$ is 4 because **"adas"** contains four characters and is the longest substring of $a = \texttt{"sadas"}$ that is also a substring of $b = \texttt{"faradast"}$.

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_j and y_j for query j.

Constraints

- $1 \leq n \leq 5 \times 10^4$
- $1 \leq q \leq 10^5$
- $0 \leq x_j, y_j \leq n - 1$
- $\sum_{i=1}^{n} |s_i| \leq 10^5$
- 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

```
3 3
probieren
birkerem
sadasment
0 1
1 2
0 2
```

Sample Output 0

```
3
1
2
```

Explanation 0

We perform the following $q = 3$ queries:

1. $F(\texttt{"probieren"}, \texttt{"birkerem"})$: 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. $F(\texttt{"birkerem"}, \texttt{"sadasment"})$: 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. $F(\texttt{"probieren"}, \texttt{"sadasment"})$: The longest substring of **"probieren"** that is also a substring of **"sadasment"** is **"en"**, so we print its length (2) on a new line.