



INOI 30

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Tehran, Iran

Summer Camp Programming Finals - Day 3

DABBEH

en (US)

Dabbeh

Rostam, the Persian hero, went on a quest to destroy the giants once and for all. He knew that there were N different type of giants, the i -th of which carried a string S_i with himself. Note that there are infinitely many giants of each type. Rostam knew that whenever he killed a giant, he would acquire the string that giant carried. Whenever he acquired a string, he could choose to delete however many characters from the end of the string (hence, removing a suffix of the string). Note that Rostam has the option not to remove any characters if he wanted to. Now Rostam is thinking to send a message to the king of the giants by killing some giants, acquiring their strings and perhaps remove some suffixes from any of the strings, and then concatenate them in any order he wishes. The cost of such message is the minimum number of giants Rostam needs to kill to write that message.



You are given a string S of length L . Now, unsure of what message to send, Rostam asks you about m different scenarios $[l_i, r_i)$. For each scenario, you have to tell Rostam what is the cost of sending the message $S[l_i, r_i)$ where $S[l_i, r_i)$ denotes the substring of S starting at position l_i and ending at position $r_i - 1$. Help Rostam save the day!

Input

The first line of input contains two space separated integers n and m , denoting the number of different types of giants and the number of scenarios you have to consider respectively.

Each of the next n lines describe the string of a different type of giant.

The next line after that contains the string S .

The next m lines each contain two integers, l_i and r_i , describing the i -th query.

Output

Output m lines, the i -th of each should contain the minimum cost of the i -th message that Rostam wants to send. If there's no way for him to send such a message, output -1 .

Constraints

- $1 \leq L, m \leq 300\,000$
- $1 \leq n \leq 10\,000$
- $0 \leq l_i < r_i \leq L$
- $\sum t_i \leq 5 * 10^5$

Subtasks

Subtasks	score	constraints
1	25	$L \leq 500$
2	25	$m \leq 10$
3	50	No additional constraints.

Examples

Standard input	Standard output
3 13	1
ab	1
ac	2
aef	3
abaaceaeef	3
0 1	-1
0 2	-1
0 3	-1
0 4	-1
0 5	-1
0 6	1
0 7	-1
0 8	-1
0 9	
1 2	
6 9	
5 9	
4 9	