# Karshilov's Matching Problem II

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|---|---|
| Input file: | `standard input` |
| Output file: | `standard output` |
| Time limit: | 2 seconds |
| Memory limit: | 256 megabytes |

Karshilov, as always, likes the string matching problem. This time, he gives a string $S$ of length $n$ and assigns a value to each prefix of $S$. Specifically, the prefix of $S$ with a length of $i(1 \le i \le n)$ is $pre_i$ and its value is $w_i$.

For any string $t$, He defines a value function $f(t) = \sum_{i=1}^{n} w_i \cdot occur(t, pre_i)$ based on the prefixes of given $S$, where $occur(t, pre_i)$ indicates the number of times $pre_i$ occurs in the string $t$. For example: $occur(\texttt{heheh}, \texttt{heh}) = 2$ and $occur(\texttt{hhh}, \texttt{h}) = 3$.

Now, Karshilov has another string $T$ of length $n$. He will give you $m$ queries. And each query will contains two integers $l, r$, indicating to query the value of $f(T[l, r])$, where $T[l, r]$ represents a substring from the $l$-th character to the $r$-th character of the string $T$ (that is, $T_l T_{l+1} \cdots T_r$).

Can you solve Karshilov's queries like you did two years ago?

## Input

The first line contains two integers, $n, m(1 \le n, m \le 150,000)$, indicating the length of string $S$ (string $T$) and the number of queries.

The second line contains a string $S$ of length $n$.

The third line contains a string $T$ with a length of $n$.

The fourth line contains $n$ integers, $w_1, w_2, \cdots w_n$, where $w_i(0 \le w_i \le 10^8)$ is the value of $pre_i$ .

For the next $m$ lines, each line contains two integers $l, r(1 \le l \le r \le n)$, which means asking the value of $f(T[l, r])$.

String $S$ and $T$ are both composed of lowercase letters.

## Output

The output contains $m$ lines. The $i$-th line contains an integer, indicating the answer of the $i$-th query.

## Examples

| standard input | standard output |
|---|---|
| 8 5<br>abbabaab<br>aababbab<br>1 2 4 8 16 32 64 128<br>1 1<br>2 3<br>3 5<br>4 7<br>1 8 | 1<br>3<br>3<br>16<br>38 |
| 15 4<br>hehehehеehhejie<br>hehehehehehehеh<br>3 1 4 1 5 9 2 6 5 3 5 8 9 7 9<br>2 3<br>4 8<br>2 6<br>1 15 | 3<br>13<br>13<br>174 |