Problem L. La Vie En Rose

Input file:	`standard input`
Output file:	`standard output`
Time limit:	3 seconds
Memory limit:	64 mebibytes

Professor Zhang would like to solve the multiple pattern matching problem, but he only has only one pattern string $p = p_1 p_2 \dots p_m$. So, he wants to generate as many pattern strings as possible from p using the following method:

1. select some indices $i_1, i_2, \dots, i_k$ such that $1 \le i_1 < i_2 < \dots < i_k < |p|$ and $|i_j - i_{j+1}| > 1$ for all $1 \le j < k$.
2. swap p_{i_j} and p_{i_j+1} for all $1 \le j \le k$.

Now, for a given a string $s = s_1 s_2 \dots s_n$, Professor Zhang wants to find all occurrences of all the generated patterns in s.

Input

The first line contains two integers n and m ($1 \le n \le 10^5$, $1 \le m \le \min(50\,000, n)$): the lengths of s and p, respectively.

The second line contains the string s, and the third line contains the string p. Both strings consist only of lowercase English letters.

Output

Output a binary string of length n. The i-th character must be '1' if and only if the substring $s_i s_{i+1} \dots s_{i+m-1}$ is one of the generated patterns. Otherwise, the character must be '0'.

Examples

standard input	standard output
4 1 abac a	1010
4 2 aaaa aa	1110
9 3 abcbacacb abc	100100100