Deep Purple

Input file:	*standard input*
Output file:	*standard output*
Time limit:	7 seconds
Memory limit:	512 mebibytes

It's always so cool to generalize well-known algorithms a bit so that they become less trivial!

Your are given a string S. Your task is to process q so-called π-queries. Each π-query is determined by two integer parameters l and r ($1 \le l \le r \le |S|$). The answer for a π-query is the largest non-negative value $x \le r - l$ such that $S[l \dots l + x - 1] = S[r - x + 1 \dots r]$ (all ranges are inclusive, all indices are 1-based). Note that $x = 0$ always satisfies the given condition because both parts of the equation are empty strings.

For example, the result of a π-query for string $S =$ "`gabacababad`", $l = 2$ and $r = 8$ is 3, since $S[2..4] = S[6..8] =$ "`aba`", and no larger value satisfies the condition above.

Input

The first line of input contains two integers n and q ($1 \le n, q \le 2 \cdot 10^5$), the length of the string S and the number of queries.

The second line contains the string S consisting of n lowercase English letters.

Each of the next q lines contain two positive integers l_i, r_i ($1 \le l_i \le r_i \le n$) that describe the i-th π-query.

Output

Print answers for each of the q queries keeping the order from the input.

Example

standard input	standard output
11 3 gabacababad 2 8 1 3 6 10	3 0 3