Light Drinking and Low Singing

Input file:	*standard input*
Output file:	*standard output*
Time limit:	5 seconds
Memory limit:	1024 mebibytes

There is a binary sequence of length n, and you need to perform q operations. The operations are as follows:

1. For the interval $[\ell, r]$, simultaneously change each adjacent pair `01` within the interval into `10`.
2. For the interval $[\ell, r]$, simultaneously change each adjacent pair `10` within the interval into `01`.
3. Query the number of `1`s in the interval $[\ell, r]$.

Input

The first line contains two integers, n and q ($1 \le n \le 2 \cdot 10^6$; $1 \le q \le 2.5 \cdot 10^5$).

The next line contains a binary string of length n: the initial binary sequence.

Each of the following q lines contains three integers, t, ℓ, and r: the type and bounds of an operation ($1 \le t \le 3$; $1 \le \ell \le r \le n$).

Output

For each operation of type 3, output a line with a single integer: the answer to the query.

Example

standard input	*standard output*
10 10 0011101100 2 5 9 3 2 5 1 1 10 1 1 5 3 4 6 1 2 5 2 4 9 3 5 10 3 2 7 3 1 8	2 1 3 3 4