E. Game Theory

For a string $s_1 \ldots s_n$ of n bits (i.e., zeros and ones), Bobo computes the f-value of $s_1 \ldots s_n$ by playing the following game.

- If all the bits are zero, the game ends.
- If there are k ones in the bit string, Bobo flips the k-th bit, i.e., s_k.
- The f-value of the bit string is the number of flips Bobo has performed before the game ends.

Formally,

- If $s_1 = \cdots = s_n = 0$, $f(s_1 \ldots s_n) = 0$.
- Otherwise, assuming that $k = s_1 + \cdots + s_n$, $f(s_1 \ldots s_n) = f(s_1 \ldots s_{k-1}\overline{s_k}s_{k+1} \ldots s_n) + 1$ where $\overline{c}$ denotes the flip of the bit c such as $\overline{0} = 1$ and $\overline{1} = 0$.

Now, Bobo has a bit string $s_1 \ldots s_n$ subjecting to q changes, where the i-th change is to flip all the bits among $s_{l_i} \ldots s_{r_i}$ for given l_i, r_i. Find the f-value **modulo** 998244353 of the bit string after each change.

Input

The input consists of several test cases terminated by end-of-file. For each test case,

The first line contains two integers n and q.

The second line contains n bits $s_1 \ldots s_n$.

For the following q lines, the i-th line contains two integers l_i and r_i.

- $1 \le n \le 2 \times 10^5$
- $1 \le q \le 2 \times 10^5$
- $s_i \in \{0, 1\}$ for each $1 \le i \le n$
- $1 \le l_i \le r_i \le n$ for each $1 \le i \le q$
- In each input, the sum of n does not exceed 2×10^5. The sum of q does not exceed 2×10^5.

Output

For each change, output an integer which denotes the f-value modulo 998244353.

Sample Input

```
3 2
010
1 2
2 3
5 1
00000
1 5
```

Sample Output

```
1
3
5
```

Note

For the first test case, the string becomes `100` after the first change. $f(\texttt{100}) = f(\texttt{000}) + 1 = 1$. And it becomes `111` after the second change. $f(\texttt{111}) = f(\texttt{110}) + 1 = f(\texttt{100}) + 2 = f(\texttt{000}) + 3 = 3$.