Maximizing the Function

HackerRank

Consider an array of n binary integers (i.e., 0's and 1's) defined as $A = [a_0, a_1, \ldots, a_{n-1}]$.

Let $f(i, j)$ be the bitwise XOR of all elements in the inclusive range between index i and index j in array A. In other words, $f(i, j) = a_i \oplus a_{i+1} \oplus \ldots \oplus a_j$. Next, we'll define another function, g:

$$g(x, y) = \sum_{i=x}^{y} \sum_{j=i}^{y} f(i, j)$$

Given array A and q independent queries, perform each query on A and print the result on a new line. A query consists of three integers, x, y, and k, and you must find the maximum possible $g(x, y)$ you can get by changing *at most* k elements in the array from 0 to 1 or from 1 to 0.

Note: Each query is independent and considered separately from all other queries, so changes made in one query have no effect on the other queries.

Input Format

The first line contains two space-separated integers denoting the respective values of n (the number of elements in array A) and q (the number of queries).
The second line contains n space-separated integers where element i corresponds to array element a_i $(0 \le i < n)$.
Each line i of the q subsequent lines contains 3 space-separated integers, x_i, y_i and k_i respectively, describing query q_i $(0 \le i < q)$.

Constraints

- $1 \le n, q \le 5 \times 10^5$
- $0 \le a_i \le 1$
- $0 \le x_i \le y_i < n$
- $0 \le k_i \le n$

Subtask

- $1 \le n, q \le 5000$ and $0 \le k_i \le 1$ for 40% of the maximum score
- $n = 5 \times 10^5$, $m = 5 \times 10^5$ and $k_i = 0$ for 20% of the maximum score

Output Format

Print q lines where line i contains the answer to query q_i (i.e., the maximum value of $g(x_i, y_i)$ if no more than k_i bits are changed).

Sample Input

```
3 2
0 0 1
0 2 1
0 1 0
```

Sample Output

```
4
0
```

Explanation

Given $A = [0, 0, 1]$, we perform the following $q = 2$ queries:

1. If we change $a_0 = 0$ to 1, then we get $A' = [1, 0, 1]$ and $g(x = 0, y = 2) = 4$.
2. In this query, $g(x = 0, y = 1) = 0$.