Problem C. Classical Data Structure Problem

Input file:	*standard input*
Output file:	*standard output*
Time limit:	3 seconds
Memory limit:	128 mebibytes

You have an integer array $A = [a_0, a_1, \ldots, a_{2^m-1}]$ of length 2^m. Initially, the array consists of zeros.

You also have an integer variable x. Initially, $x = 0$.

For each $i = 1, 2, \ldots, n$, you are given two integers p_i and q_i, and you have to perform the following steps:

- Let $p' = (p_i + x) \bmod 2^m$ and $q' = (q_i + x) \bmod 2^m$.
- Let $l = \min(p', q')$ and $r = \max(p', q')$.
- For each $j = l, l + 1, \ldots, r$, increase a_j by i, then increase x by a_j.

Find the value of $x \bmod 2^{30}$ at the end of this process.

Input

The first line contains two integers n and m ($1 \le n \le 500\,000$; $1 \le m \le 30$).

The i-th of the following n lines contains two integers p_i and q_i ($0 \le p_i, q_i < 2^m$).

Output

Print the value of $x \bmod 2^{30}$.

Example

standard input	*standard output*
5 2 2 1 1 3 3 2 1 0 0 2	87

Note

In the example test, initially, $A = [0, 0, 0, 0]$ and $x = 0$. Then:

- For $i = 1$, we have $l = 1$ and $r = 2$. Then, $A = [0, 1, 1, 0]$ and $x = 2$.
- For $i = 2$, we have $l = 1$ and $r = 3$. Then, $A = [0, 3, 3, 2]$ and $x = 10$.
- For $i = 3$, we have $l = 0$ and $r = 1$. Then, $A = [3, 6, 3, 2]$ and $x = 19$.
- For $i = 4$, we have $l = 0$ and $r = 3$. Then, $A = [7, 10, 7, 6]$ and $x = 49$.
- For $i = 5$, we have $l = 1$ and $r = 3$. Then, $A = [7, 15, 12, 11]$ and $x = 87$.