

(F)Find a Room

Description

After a pleasant afternoon strolling down the street, it is the time to have a rest. Mr. Le and Ms. Y then go to the hotel. One problem arises naturally: the hotel is large, and they need to decide which room they will live in. Formally, the hotel can be represented as a matrix, in which every cell represents one room. All rooms have their own number x which is a positive integer, and it is disordered (to protect privacy). The column is indexed from left to right from 1 to 10^9 . The row is indexed from top to bottom from 1 to 10^9 . And there is a regular pattern by design, that for every room whose coordinate is (x, y) ($x, y \geq 2$), its number equals $(x - 1) \text{ xor } (y - 1) + 1$. For the first row (column), the number of the room is its column (row) number. Here is the upper left 4×4 block of the hotel:

1	2	3	4
2	1	4	3
3	4	1	2
4	3	2	1

Then Ms. Y puts forward a request of nonsense – she wants a room whose number is equal to the sum of all elements that are less than or equal to k in a specific sub-matrix. As the number may be quite large, you are only asked to calculate it modulo 10^9+7 .

Input

The first line is the number T ($1 \leq T \leq 10^4$) – the number of test cases. Then T lines follow, each of which contains five integers:

$x1, y1, x2, y2, k$ ($1 \leq x1 \leq x2 \leq 10^9, 1 \leq y1 \leq y2 \leq 10^9, 1 \leq k \leq 2 * 10^9$)

$(x1, y1)$: the left upper corner of the sub-matrix

$(x2, y2)$: the lower right corner of the sub-matrix

k : the constraint.

Output

For each test case, print the corresponding answer.

Example

Input

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3
3 2 5 4 5
1 1 2 2 1
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Output

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13
2
6
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1 1 2 2 2	
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