Problem B
Bipartite Battle

A Bipartite Graph is an undirected graph whose vertices can be partitioned into 2 sets such that, for each edge (u, v), u and v belong to different sets.

Socket has challenged Bash to a Bipartite Battle. In the Bipartite Battle, Bash and Socket play a game with Bipartite Graphs.

The Bipartite Battle happens as follows:

- Socket draws N bipartite graphs. The i-th graph has 2 sets of vertices, one with a_i vertices, and the other with b_i vertices.
- Then the 2 players, Bash and Socket alternatively take turns. In each turn, a player must choose exactly one non-empty graph, then delete exactly one edge or exactly one vertex of the chosen graph. If the player deletes one vertex, all edges adjacent to it are also deleted.
- The player who cannot move loses. Note that this can only happen when all edges and all vertices of all graphs have been deleted.
- Bash plays first.

Of course, Socket does not want to play fair. Socket plans to draw bipartite graphs such that he always wins.

How many ways can Socket draw N bipartite graphs, so that he always wins, assuming both players play optimally?

Notes

For the i-th bipartite graph, let's number the vertices in first set from 1 to a_i, and the vertices in second set from 1 to b_i.

An edge connecting vertex u in first set and vertex v in second set is denoted as (u, v).

Two drawings of bipartite graphs are considered different iff there exists an index j and a pair of integers (u, v), such that:

- (u, v) is an edge of j-th graph in one drawing.
- (u, v) is NOT an edge of j-th graph in the other drawing.

Input

The first line of input contains the integer N ($1 \le N \le 10^5$).

N lines follow, each line contains exactly 2 space-separated integers a_i and b_i ($1 \le a_i, b_i \le 10^9$).

Output

Print exactly one integer — the number of ways Socket can draw N bipartite graphs, modulo $10^9 + 7$.

Sample Input 1	Sample Output 1
1 1 1	1

Sample Input 2	Sample Output 2
1 1 2	0