

C. All-Star Team (round 2)

Input: standard input (from the keyboard)

Output: standard output (to the screen)

Time limit: 1 seconds

Memory limit: 256 Mb

Problem

There are N teams playing in the Highest Basketball League. The National Committee wants to choose one player from each team for the national team. To do this, each team recommended two of its players, and only one from a pair should be chosen. But not all of the players from different teams are psychologically compatible. Thus, the task of the Committee is to choose one player from each pair in such a way, that all chosen players are compatible. Moreover, the optimal team should have the largest possible total height of players.

Knowing the height of each player, and who is compatible and incompatible with each other, answer if the compatible team exists, and what players should play in it.

Input

The first line of input contains one natural number N – number of teams ($1 \leq N \leq 40$).

Each of next N lines of the input contains two natural numbers: a_i, b_i ($165 \leq a_i, b_i \leq 229$) – the height of the first player from i^{th} team and the height of the second player from i^{th} team in centimetres.

Next line contains integer M ($0 \leq M \leq 3120$) – number of pairs of incompatible players. Each of next M lines contains four integers: i, j, k, p ($1 \leq i, j \leq N, i \neq j, k, p \in \{1,2\}$), that means that k^{th} player of i^{th} team is psychologically incompatible with p^{th} player of j^{th} team.

Output

If the compatible team does not exist, write “-1” to the output. Otherwise, write N numbers. The i^{th} number should be “1” if the first player from i^{th} team should be chosen or “2” if the second player from i^{th} team should be chosen. If there are several optimal teams (compatible teams with the largest possible total height of players), write the lexicographical smallest record.

Example

Input	Output
3 196 213 213 208 211 216 6 1 2 2 1 1 2 1 2 2 3 1 2 2 3 2 1 3 1 1 1 3 1 2 2	-1
3 196 213 213 208 211 216 6 1 2 2 1 1 2 1 2 2 3 1 2 2 3 2 1 3 1 1 2 3 1 2 1	2 2 2