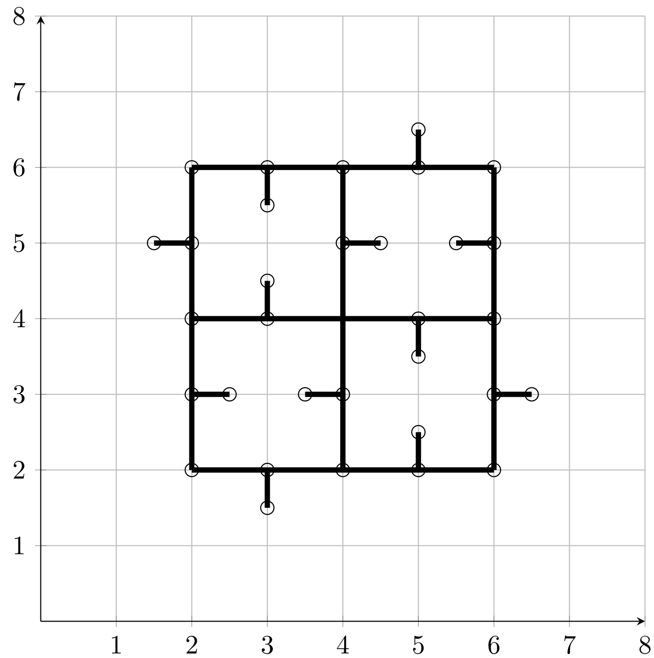
Solution for ‘parks’

It turns out that a construction always exists whenever it is possible to connect the fountains by roads. For a given set of roads, methods like bipartite matching or 2-SAT can determine if that set of roads can produce a solution. Therefore, when the set of roads is unique (subtask 4), 2-SAT is sufficient.

A possible approach is to simply construct every road whenever we have a pair of fountains distance 2 apart. This approach works whenever there is no 2×2 square (subtask 5).

For the full solution, we tile the plane in a chessboard manner and always assign benches according to the following rule:



Now we sort the fountains by lexicographical order (increasing $x + y$ also works).

Whenever we encounter a new fountain (x, y), we connect this fountain to $(x, y - 2)$ if the fountain $(x, y - 2)$ exists and its corresponding bench is not occupied.

We do the same for $(x - 2, y)$.