

D. Ants

time limit per test: 1 second
memory limit per test: 256 megabytes
input: standard input
output: standard output

It has been noted that if some ants are put in the junctions of the graphene integer lattice then they will act in the following fashion: every minute at each junction (x, y) containing at least four ants a group of four ants will be formed, and these four ants will scatter to the neighbouring junctions $(x + 1, y)$, $(x - 1, y)$, $(x, y + 1)$, $(x, y - 1)$ — one ant in each direction. No other ant movements will happen. Ants never interfere with each other.

Scientists have put a colony of n ants into the junction $(0, 0)$ and now they wish to know how many ants will there be at some given junctions, when the movement of the ants stops.

Input

First input line contains integers n ($0 \leq n \leq 30000$) and t ($1 \leq t \leq 50000$), where n is the number of ants in the colony and t is the number of queries. Each of the next t lines contains coordinates of a query junction: integers x_i, y_i ($-10^9 \leq x_i, y_i \leq 10^9$). Queries may coincide.

It is guaranteed that there will be a certain moment of time when no possible movements can happen (in other words, the process will eventually end).

Output

Print t integers, one per line — the number of ants at the corresponding junctions when the movement of the ants stops.

Examples

input
1 3 0 1 0 0 0 -1
output
0 1 0

input
6 5 0 -2 0 -1 0 0 0 1 0 2
output
0 1 2 1 0

Note

In the first sample the colony consists of the one ant, so nothing happens at all.

In the second sample the colony consists of 6 ants. At the first minute 4 ants scatter from $(0, 0)$ to the neighbouring junctions. After that the process stops.