

## B. 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.