fares and basketball

Input file:	`standard input`
Output file:	`standard output`
Time limit:	1 second
Memory limit:	256 megabytes

Fares is a good basketball player and a good programmer aswell . While training there was n basketball balls on the ground . His friend wanted to challenge him and asked him to determine for every ball the distance of the closest ball to that ball , and how many balls have that minmum distance from that ball .

The distance between two balls A(x_1,y_1) and B(x_2,y_2) is equal to d = $|x_1\text{-}x_2|+|y_1\text{-}y_2|$.

Your task is to help fares to answer his friend .

Input

The first line contains one integer n ($2 \leq n \leq 1000$) — the number of the baskettball balls .

Each of the next n lines contains two integers x_i and y_i ($1 \leq x_i \leq 10^9$, $1 \leq y_i \leq 10^9$) — the coordinates of the i'th ball .

Output

Print n lines, where in the i-th line you should output two numbers — the distance of the closest ball to the ith ball and the number of balls having that minmum distance from the ith ball .

Examples

standard input	standard output
4 1 2 1 1 2 1 2 2	1 2 1 2 1 2 1 2
2 1 1 1 1	0 1 0 1