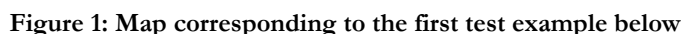


For the purpose of this task, the map of the Adriatic sea is a grid consisting of unit squares organized into 2500 rows and 2500 columns. Rows are numbered 1 through 2500, north to south, while columns are numbered 1 through 2500, west to east. There are  $N$  islands in the sea, numbered 1 through  $N$  and each island is located inside some unit square of the grid. The location of island  $K$  is given by the coordinates of the corresponding grid square - its row number  $R_K$  and its column number  $C_K$ . Finally, no two islands have the same location.



For example, in the figure above, starting from the island at row 2, column 3, we can hop to four other islands while the sailing distance to the remaining two islands is two.

Test data will be such that, for all islands  $A$  and  $B$  it is possible to sail from  $A$  to  $B$  using some sequence of hops.

## INPUT

The first line of input contains an integer  $N$  ( $3 \leq N \leq 250\,000$ ), the number of islands. The following  $N$  lines contain the locations of the islands. Each location is a pair of integers between 1 and 2500 (inclusive), the row and column numbers, respectively.

## OUTPUT

The output should contain  $N$  lines. For each island, in the same order they were given in the input, output the sum of sailing distances from all other islands on a single line.

## GRADING

- In test cases worth a total of 25 points,  $N$  will be at most 100.
- In test cases worth a total of 50 points,  $N$  will be at most 1500.
- In test cases worth a total of 60 points,  $N$  will be at most 5000.
- In test cases worth a total of 80 points,  $N$  will be at most 25000.

## EXAMPLES

### input

```
7
1 7
7 5
4 5
4 8
6 6
6 1
2 3
```

### output

```
16
11
12
11
12
16
8
```

### input

```
4
1 1
2 3
3 2
4 4
```

### output

```
3
4
4
3
```