

8035 Gotta Catch 'Em All

Ash Ketchum is a Pokemon trainer who is on a mission to catch all Pokemons in the world. Fortunately, he has caught most of them and he needs to collect K more different types of Pokemons to complete his set.

As you may already know, Ash lives in a 2D grid world. Pokemons spawn at integer coordinates on this grid. In this world there can be multiple Pokemons of the same type. Remember, Ash needs to catch K more different types of Pokemons not any K Pokemons.

Ash decided to catch those Pokemons by throwing a big squared net from the sky. A Pokemon is considered to be caught if the Pokemon lies within the boundaries of the net or even on one of its edges. Ash wants to find a square that contains those Pokemons where each side of the square is either parallel to the x -axis or to the y -axis.

Can you help Ash find the minimum side of the square that contains K different types of Pokemons so that he can buy an appropriate sized net to catch 'em all? Since nets need to always have a positive area, the side of the square needs to be positive.

Input

Your program will be tested on one or more test cases. The first line of the input will be a single integer T , the number of test cases ($1 \leq T \leq 100$).

Each test case starts with a line that contains two space separated integers:

- N : Number of Pokemons in the world ($2 \leq N \leq 1000$)
- K : Number of types of Pokemons ($2 \leq K \leq 100$)

Followed by N lines each containing 3 space separated integers:

- X : The x -coordinate of the Pokemon ($-1,00,000,000 \leq X \leq 1,00,000,000$)
- Y : The y -coordinate of the Pokemon ($-1,00,000,000 \leq Y \leq 1,00,000,000$)
- Z : The type of the Pokemon ($1 \leq Z \leq K$)

Output

For each test case, print a single line containing the minimum side of a square that contains K different types of Pokemons.

Sample Input

```
2
5 2
0 0 1
0 1 1
0 2 1
2 0 2
2 1 2
3 3
0 0 1
1 1 2
2 2 3
```

Sample Output

2
2