

In the land of our great Sultan, the World Weird Fence (WWF) festival is going to take place again. For the festival, some poles are set up in a Cartesian plane. Each pole is colored in either red or blue color. You can connect two poles with a chain that consists of multi-colored rings thus creating a weird fence. Each pole has a single hook so you can not connect more than one chain to a pole. Now, though you have an unlimited supply of chains all having the same length, it's important to note that each of the chains has a red ring at one end and a blue ring at the other end and you are only allowed to hook up a ring to a pole with same color. Also, it's obvious that you can use a chain to connect two poles if and only if the chain's length is greater than or equal to the linear distance of those two poles.



Given the co-ordinates of the poles and a positive integer k , write a program to find the minimum possible integer length for the chains so that at least k weird fences can be made. The fences may cross each other.

Input

The first line of the input file is the number of test cases N . This line will be followed by a blank line. N test cases follow. First line of each test case contains two positive integers P and k where P is the number of poles on the plane. ($1 \leq P, k \leq 100$). Each of the next P lines has two integers X and Y and the word 'red' / 'blue'. X and Y are the co-ordinates of the pole ($-1000 \leq X, Y \leq 1000$) and the word is the color of that pole. No two poles will be in the same location. There will be a blank line between test cases.

Output

For each test case output a single integer in a line which is the minimum integer length of the chains that is necessary to make at least k fences. If it is not possible to build k fences with the given constraints, print the word 'Impossible' in a single line.

Sample Input

```
2

6 2
-3 5 blue
-3 3 red
1 5 blue
2 0 red
4 6 blue
4 -1 red

6 4
-3 5 blue
-3 3 red
1 5 blue
2 0 red
4 6 blue
4 -1 red
```

Sample Output

```
6
Impossible
```