Subway Stations

It was only quite recently that Lea has moved to her new apartment. She is still getting used to the local public transportation system and all its different stations and lines. And you cannot believe how vastly big and complex the local transportation network is. What brings it from bad to worse is the fact that there are ever ongoing constructions and constant changes in it. This is why most people just get on the subway on the next station they can find and hop off on another randomly, doing this for quite some time until they are close enough to their destination to walk the remaining distance. But this is nothing for Lea, she wants to plan her trips with the subway exactly and find out the minimal number of transfers between subway lines to get to wherever she wants. Many have tried this before her, as many have failed. But this does not bring Lea down. Even more so, she wants to succeed. And with your help, what can go wrong?

Input

The first line of the input contains an integer t. t test cases follow.

Each test case begins with a line containing an integer n, the number of subway stations, and four floating point numbers x_{start} y_{start} x_{end} y_{end}, describing the coordinates of Lea's starting and destination stations, respectively. n lines follow, each containing an integer m_i and $2 \cdot m_i$ more integers $x_{i,1}$ $y_{i,1}$ $\ldots$ x_{i,m_i} y_{i,m_i}, describing the i-th subway line that starts with a station at $(x_{i,1}, y_{i,1})$ and goes in a straight line on to $(x_{i,2}, y_{i,2})$, then straight to $(x_{i,3}, y_{i,3})$, and so on until the terminal station at (x_{i,m_i}, y_{i,m_i}).

Output

For each test case, output "Case #i: x" where i is its number, starting at 1, and x is either the minimal number of subway line transfers required to get from (x_{start}, y_{start}) to (x_{end}, y_{end}); or "impossible" if there is no way to travel from start to end. The number of stations travelled does not matter, only the number of transfers.

Constraints

- $1 \leq t \leq 20$
- $1 \leq n \leq 100$
- $1 \leq m_i \leq 100$ for all $1 \leq i \leq n$
- $0 \leq x_{i,j}, y_{i,j} \leq 10000$ for all $1 \leq i \leq n$ and $1 \leq j \leq m_i$
- Each point $(x_{i,j}, y_{i,j})$ is a station, for all $1 \leq i \leq n$ and $1 \leq j \leq m_i$.
- There is a station at each intersection point of two subway lines.
- (x_{start}, y_{start}) and (x_{end}, y_{end}) are both stations in the network, i.e., each of them either appears in the input, or is an intersection point.
- $x_{start}, y_{start}, x_{end}$, and y_{end} are given with up to 15 digits after the decimal point.

Sample Input 1

```
3
3 1.0 3.0 0.0 4.0
4 1 6 4 6 4 2 1 0
3 0 4 6 4 8 2
2 4 0 1 3

3 2.0 0.0 6.0 6.0
4 2 0 2 6 4 2 4 6
3 1 4 6 4 6 8
5 3 8 5 7 7 5 3 3 1 4

3 2.0 0.0 3.0 2.0
4 2 0 2 5 6 5 6 0
2 1 3 7 3
2 3 2 5 2
```

Sample Output 1

```
Case #1: 2
Case #2: 1
Case #3: impossible
```

Sample Input 2

```
7
5 8.0 4.0 10.0 4.0
5 2 10 1 1 3 7 2 8 5 2
2 8 9 3 2
3 10 4 10 4 9 3
3 8 4 2 5 7 3
5 9 3 7 9 9 1 2 3 8 2

5 10.0 4.0 2.0 3.0
4 1 8 7 5 7 9 1 2
3 5 7 5 7 4 3
4 9 6 2 3 9 3 6 5
2 6 5 9 8
3 10 4 9 8 8 3

4 8.0 5.0 8.0 5.0
3 8 8 4 1 8 10
4 1 1 8 5 10 3 9 7
5 8 10 8 5 8 6 7 4 5 9
5 7 4 3 9 7 7 6 4 3 4

2 8.0 9.0 9.0 3.0
3 9 8 2 1 9 3
4 8 9 7 7 2 10 2 8

4 8.0 2.0 2.0 4.0
2 9 10 2 4
4 9 6 8 5 8 2 6 2
3 2 6 6 9 9 10
3 6 2 2 5 2 6

2 8.0 7.0 8.0 8.0
5 8 8 8 7 5 10 3 2 9 4
2 4 8 5 9

5 9.0 2.0 4.0 7.0
2 4 6 8 5
5 7 7 5 4 7 6 9 2 5 7
3 7 9 9 2 10 4
5 3 7 6 4 7 2 8 10 5 5
2 4 7 5 7
```

Sample Output 2

```
Case #1: 3
Case #2: 1
Case #3: 0
Case #4: impossible
Case #5: 2
Case #6: 0
Case #7: 1
```