ETH Zurich
Institut für Theoretische Informatik
Prof. Dr. Angelika Steger
Prof. Dr. Emo Welzl
Prof. Dr. Peter Widmayer

HS 2014
Exercise Sheet BGL Week I

Algorithms Lab

Exercise 3 – *Shy Programmers*

Finally, you are in charge of your own software project! This is not a piece of cake, though. You hired some programmers and now need to place their workstations in a rectangular room. The space is not a problem – your programmers need hardly more than a chair and a small desk, so you can assume they occupy a single point on the plane – just don't put two of them in the same place!

The real issue is a social one. Some of your programmers are friends with each other. Of course each pair of friends likes to talk to each other from time to time, so you want to make a placement such that the friends can move in a straight line between their workstations – no other workstation on their way (you don't want the shape of the path to be more complicated than a straight segment in case a programmer is busy thinking about her code on the way).

What is more, your employees do not like surprises, especially when it comes to bumping into other people, sometimes people who they don't even know! Hence, to avoid the risk of unexpected encounters, you want to place them so that no two paths connecting friends cross or touch each other except in their endpoints.

Last but not least, even your hard-working coders need to have lunch or use a toilet from time to time. Again, you want to make it easy and predictable for them. Thus, you decide to put a separate door for each programmer in the wall of the room so that a programmer can go from her place to the door in a straight line. As previously, those paths should not cross with each other or any of the previous paths except in their endpoints.

As a first step to the success of your project you want to establish if such a placement is even possible given the friendship network of your employees.

Input The first line of the input contains $1 \leq t \leq 100$, the number of testcases. Each testcase starts with a line containing $1 \leq n \leq 10^5, 0 \leq m \leq 2 \cdot 10^5$, where n is the number of employees and m is the number of pairs of friends. We assume that employees are numbered from 0 to $n-1$. m lines follow, each defining a pair of friends $0 \leq a_i < b_i < n$. In each line consecutive numbers are separated with single spaces. No pair of friends appear more than once in a testcase.

Output For each testcase output a single line containing `yes` if a placement is possible and `no` otherwise.

NOTE Watch out for large inputs and read the data efficiently.

Sample input

```
2
5 6
0 1
0 2
1 2
2 3
2 4
3 4
4 6
0 1
0 2
0 3
1 2
1 3
2 3
```

Sample output

```
yes
no
```

Illustration of a sample test