

IOI Training Camp 2010 – Final 3, 27 June, 2010

Problem 1 Zorgian Mafia¹

The Zorgian Mafia follows the code of Zomerta where anyone who talks to the police is sent to the dungeons to watch reruns of *Friends* forever. Typically, they last about 2 hours before dying of boredom and so the dungeon is never full. Well, this has nothing to do with the rest of the problem, so even if you are a *Friends*-loving hobo, read on.

Every gang member reports to number of bosses and a boss may have a number of gang members reporting to him. Needless to say, by following a chain of bosses one can never get back where one started. A member m is said to have a complete set of bosses if the following is true: For any pair of bosses b_1 and b_2 of m , either b_1 is a boss of b_2 or b_2 is a boss of b_1 . A subset of gang members is said to be *boss-free* if no member in the subset has a boss within the subset.

The list of gang members $1, 2, \dots, N$ is available with the police and so is a list of pairs (i, j) , indicating that i is a boss of j . Amazingly, it turns out that if i is a boss of j , then $i < j$.

Detective Inspector GluSow believes that every member has a complete set of bosses and he would like to find out whether this is true. If that is indeed the case, he wants you to find the largest boss-free subset and report its size. On the other hand, if your investigation finds that there are gang members who do not have a complete set of bosses, he would like you to report the first gang member (in the sequence $1, 2, \dots, N$) who does not have a complete set of bosses.

Input format

The first line of input contains two integers N and M where N is the number of gang members and M is the number of pairs of the form (i, j) indicating that i is a boss of j .

This is followed by M lines, each containing two integers i and j , $i < j$, describing a boss-underling pair (i, j) .

¹Problem formulated by Srivatsan.

Output format

If all members of the gang have a complete set of bosses, the first line of output should contain the word **YES** and the second line should contain a single integer, the size of the largest boss-free subset.

Otherwise, the first line of output should contain the word **NO** and the second line should contain a single integer, the smallest i such that gang member i does not have a complete set of bosses.

Test Data

You may assume that $2 \leq N \leq 100000$ and $1 \leq M \leq 500000$.

Sample input 1

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

Sample output 1

```
YES
2
```

Sample input 2

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

Sample output 2

```
NO
4
```

Time and memory limits

The time limit for this task is 3 seconds. The memory limit is 44 MB (actual limit 32 MB, plus 12 MB buffer for 64-bit compilation).