International Olympiad in Informatics 2020
Practice Session
March 28, 2020
Singapore, Singapore
Session 7 Tasks

`goneviral`
English (US)

Gone Viral

There is a mysterious virus going around the National University of Singapore—and it might be deadly!

There are n people in the National University of Singapore. There are $n-1$ friendships between them; all friendships are mutual. It is guaranteed that between any two different people x and y, either they are friends or there is a chain of $t \geq 1$ people $p_1, p_2, \ldots, p_t$ such that x and p_1 are friends, p_t and y are friends, and for all $i < t$, p_i and p_{i+1} are friends.

It is known that k people in the National University of Singapore are infected with the virus.

The University Health Center has decided to use the following conservative model: every day, a person meets with at most one of his friends. If someone meets with an infected person, he or she becomes infected as well.

Assume that someone who is infected will stay infected forever.

What is the minimum number of days before it is possible that everyone is infected?

Input format

The first line of input contains two integers n and k, the number of people and the number of people affected by the virus, respectively.

The next line contains k integers $a_1, a_2, \ldots, a_k$, the people who have the virus.

The next $n-1$ lines describe the friendships. The i^{th} line among these contains two integers x_i and y_i, denoting that x_i and y_i are friends.

Output format

Output a single integer on a line by itself, the minimum number of days before it is possible that everyone is infected.

Note that, if everyone is already infected, the answer is 0.

Subtasks

In all subtasks $1 \leq k \leq n$, $1 \leq x_i, y_i \leq n$ and $x_i \neq y_i$.

Subtask	Points	n	k
1	36	$n \leq 2\,000$	$k = 1$
2	8	$n \leq 100\,000$	$k = 1$
3	12	$n \leq 2\,000$	$k \leq 2$
4	44	$n \leq 100\,000$	$k \leq 2$

Example

Consider the following input:

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

The correct output is:

```
3
```

In this case, there are 6 people and person 3 is infected.

1. On the 1^{st} day, persons 3 and 4 meet. Then 4 becomes infected.
2. On the 2^{nd} day, persons 2 and 3 meet, and persons 4 and 5 meet. Then both 2 and 5 become infected.
3. On the 3^{rd} day, persons 1 and 3 meet, and persons 4 and 6 meet. Then both 1 and 6 become infected.

It is easy to see that there is no way for everyone to be infected in fewer days.

Now consider the following input:

```
10 2
1 10
1 2
2 3
3 4
4 5
5 6
```

```
6 7
7 8
8 9
9 10
```

The correct output is:

```
4
```