

2023 A SPLASH OF MILK

Houses in *The Endians* are connected by a sophisticated series of tubes, providing a constant supply of tea to insatiable residents. In the event of a catastrophe, such as milk contaminating the supply, an emergency cutoff system kicks in to limit the spread. He is currently busy pedaling his bike around the houses turning off valves.

There are h houses (numbered 1 to h) and each is connected directly to at most three other houses. It takes an hour for milk to spread from each contaminated house to all directly connected houses. Similarly, it takes an hour to pedal between any two houses. On reaching a house the valves are instantaneously turned off, cutting the house off from all other houses. It is not permitted to visit a house that is already contaminated.

The contamination starts at house 1 and the residents, currently prophesying war, wish to minimise the number of houses that become contaminated. House 1, due to being connected to the local pumping station, is only directly connected to at most two other houses.

For example, suppose the tubes connect 1-2, 1-3, 2-4, 2-5 & 4-5:

- House 1 is contaminated at hour 0;
- If house 3 is cut off, at hour 1 houses 1 & 2 will be contaminated. If house 4 is then cut off, at hour 2 houses 1, 2 & 5 will be contaminated. No more houses remain to be contaminated.
- If instead house 2 was initially cut off, at hour 1 houses 1 & 3 will be contaminated. Houses 4 & 5 can no longer be reached by the tubes so will not be contaminated.

SAMPLE INPUT

```
5
1 2
3 1
4 2
5 2
4 5
-1 -1
```

The first line of input will consist of a single integer, h ($2 \leq h \leq 2^{12}$), indicating the number of houses. Successive lines will consist of a pair of integers, indicating two distinct houses connected by a tube. No tube will be duplicated in the input. The input will be terminated by the line $-1 \ -1$.

You should output a single integer, the minimum number of houses that must become contaminated.

SAMPLE OUTPUT

```
2
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