British Informatics Olympiad Final

28 – 30 March, 2008

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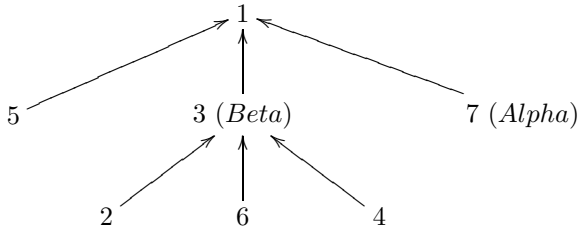
Infiltration

Alpha Complex has been infiltrated by spies from Beta Complex. Again. Fortunately it has been restricted to the canine division and the higher echelons are confident that they can discover the depth of the infiltration by some rigorous vetting.

The devision is strictly hierarchical with each agent, except the division's head, having a single boss. Multiple agents are able to share the same boss. Some enemy agents entered the devision and then recruited other agents. Enough time has passed that any boss working for Beta complex will have recruited all, or all-but-one, of the agents working directly under them. Similarly, if three or more agents are working for the same boss and all, or all-but-one, of them works for Beta complex, their boss will have been recruited.

Vetting is expensive and only some of the agents are known to definitely be working for Alpha or for Beta Complex. For example, in the following hierarchy the true allegiance of only two agents is known:



It can be inferred that, because their boss works for Beta Complex, at least two of agents 2, 6 and 4 must also work for Beta Complex. Similarly, either both agents 1 and 5 work for Beta Complex or neither works for Beta Complex.

Write a program which determines both the maximum and minimum number of agents who can be working for Beta Complex. The first line of the input will consist of a single integer n ($1 \leq n \leq 2^{16}$) indicating the number of agents in the division. The next $n-1$ lines will contain details for agents 2 to n (one per line and in order). Each of these lines will contain an integer, indicating the boss for this agent, followed be the letter `A`, `B` or `U` indicating that the agent definitely works for Alpha Complex, Beta Complex or whether that is unknown. Agent 1, whose details are not given, is the head of the division and may be working for Alpha or Beta complex. Starting from any agent, if you keep moving up to their boss, you will ultimately reach Agent 1.

All the input will be consistent with the recruitment conditions.

You should output a pair of integers; the maximum, followed by the minimum, number of agents who can be working for Beta Complex.

Sample Input

```
7
3 U
1 B
3 U
1 U
3 U
1 A
```

Sample Output

```
6 3
```