British Informatics Olympiad Final

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Alpha Complexities

Alpha complex is large and sprawling, its many rooms and corridors designed to confuse the uninitiated. Corridors are clearly marked with their security level (`a` to `y` inclusive), but the rooms are essentially indistinguishable, as are corridors with the same security level.

The only way to move between two rooms is through a connecting corridor. The security doors leading from the rooms to the corridors sometimes only open in one direction, so a route from A to B does not necessarily mean there is a corresponding route from B to A. Indeed, security features on these doors mean only those that can be opened from within a room are visible inside that room; without handles the doors just look like parts of the wall. No room has two exit corridors with the same security level.

All rooms also have a fire escape (not shown on maps) which leads outside the complex, from where the complex can be re-entered at its first room. Furthermore, it is possible to reach any room in the complex, from the first room, by following an appropriate sequence of corridors.

Several years ago spies broke into Alpha complex to map its rooms and corridors. The spies mapped the complex by moving from room to room, the only information available to a spy in a given room being the security labels of its exit corridors. They succeeded in creating maps but, due to difficulties in distinguishing locations, it is possible that some of the locations were duplicated. Spies continued mapping the complex, using fire escapes if necessary, until they believed every corridor from every room had been explored. In other words, if the spies duplicated a room, they explored every corridor from each copy of that room

For example, suppose Alpha complex has two rooms (1 and 2) and two corridors: a corridor labelled `a` leading from 1 to 1, and a corridor labelled `b` leading from 1 to 2. It might have been mistakenly mapped as if it had three rooms (1, 2 and 3) and four corridors: from 1 to 2 labelled `a`, from 1 to 3 labelled `b`, from 2 back to 2 labelled `a`, and from 2 to 3 labelled `b`.

Information has just been leaked which may enable these maps to be perfected - Alpha complex is minimal. In other words, it is not possible for a spy to produce a map of Alpha complex with fewer rooms than the actual complex.

Write a program which, given a spy's map of Alpha complex, produces the actual (minimal) map. The first line of the input will be an integer n ($1 \leq n \leq 100$) indicating the number of rooms in the spy's map; rooms are numbered from 1 to n with the initial room of the complex being room 1. This will be followed by a list of corridors, one per line; a corridor will be given by a lowercase letter (indicating the security level), then the room the corridor is from, and finally the room the corridor goes to. The list of corridors will be terminated by the line `z -1 -1`.

You should output the actual map of Alpha complex, using the same format as the input. NB: The initial room of the complex must still be numbered 1 and you must remember to terminate your list of corridors.

Sample Input

```
6
x 1 1
a 1 2
b 2 3
c 3 4
x 4 4
a 4 5
b 5 6
c 6 1
z -1 -1
```

Sample Output

```
3
x 1 1
a 1 2
b 2 3
c 3 1
z -1 -1
```