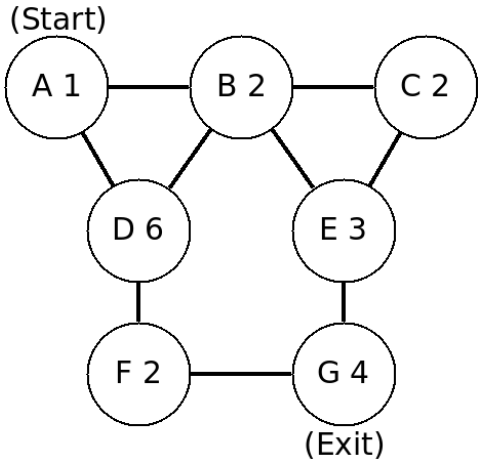
Problem G: Escape the Cave of Wonders

Aladdin is tricked by Jafar into retrieving the magic lamp from the Cave of Wonders. Aladdin knows not to touch anything except for the lamp – touching any of the other fabulous treasures will cause the cave to collapse on itself. Aladdin finds the lamp and picks it up to return it to Jafar.

Unfortunately just as Aladdin is retrieving the lamp, his pet monkey Abu is unable to resist a large red ruby. When he picks it up, the cave begins to collapse. The Cave of Wonders contains a number of rooms connected together by passageways. The rooms collapse on themselves at different times. In his escape, Aladdin needs to reach the exit without going through a room which has already collapsed, or being in a room while it collapses. You need to write a program which will read in the structure of a cave including when each room collapses, and determine if and how he can reach the cave's exit.

Below is an example cave. Aladdin begins in room A and must get to the exit, room G. The numbers refer to the step after which the room collapses. So room A will collapse after Aladdin's first step, and room B after his second. Aladdin always takes 1 step to travel from one room to another.



Aladdin can reach rooms B and D immediately. If he goes to room D, he will not be able to reach the exit because room F will collapse after his second move (when he would reach room F), so he must start by going to room B. Likewise Aladdin cannot continue to room C, but must escape via rooms E then finally G. This case appears as Sample Input 1 below.

Sample Input 2 is identical, except that room E collapses after step 2 instead of 3. That makes the cave impossible to exit – in this case Aladdin has no escape!

Input

The first line of input contains an integer N giving the number of rooms in the cave. Following that are N lines, one for each room. Each of these lines contains an upper-case character which gives the name of the room, and an integer giving the step at which the room collapses.

The first room listed is the one in which Aladdin begins, and the last room is the one he must reach in order to escape.

Next is a line containing an integer M giving the number of passageways in the cave. Following that are M lines which give the passageways. Each of these lines consists of two characters, indicating which two rooms the passageway connects. The passageways are bi-directional and only listed for one direction – so BC can be used to travel from room B to C or from C to B.

Output

If there is a way for Aladdin to escape the cave, your program should print "Aladdin can escape: " followed by the sequence of moves by which Aladdin can escape the cave. The sequence should be given as a string of upper-case characters which indicate which rooms Aladdin travelled through (including the starting cave and exit). If there are multiple solutions, print any of them.

Your program should output "Aladdin can not escape!" if there is no escape from the cave.

Sample Input 1

```
7
A 1
B 2
C 2
D 6
E 3
F 2
G 4
```

```
9
AB
AD
BC
BD
BE
CE
DF
EG
FG
```

Sample Output 1

```
Aladdin can escape: ABEG
```

Sample Input 2

```
7
A 1
B 2
C 2
D 6
E 2
F 2
G 4
9
AB
AD
BC
BD
BE
CE
DF
EG
FG
```

Sample Output 2

```
Aladdin can not escape!
```