Level 4 - Connection proposal

Now it is your turn to propose a direct hyperloop connection.

The input is similar to Level 3, but you won't be given a hyperloop connection. Instead you will be given a target number, N, of journeys to benefit from the hyperloop.

You should output a hyperloop connection. Of the input journeys, at least N must be faster using your hyperloop connection than currently. The hyperloop journey time is given by the rules from Levels 1 and 2. There may be multiple valid solutions, but you only need to find one.

Data format

Input

A text file consisting of the following lines:

Single line: <NumberOfLocations>
NumberOfLocations lines: <LocationName> <LocationX> <LocationY>
Single line: <NumberOfJourneys>
NumberOfJourneys lines: <LocationName> <LocationName> <CurrentTime>
***Single line:* <N>**

Output

Single line: <HyperloopStartLocationName> <HyperloopEndLocationName>

Level 4

Example

Input

```
5
Prague 0 286100
Brno 152440 194430
Vienna 126350 78010
Bratislava 183680 71710
Budapest 318860 0
3
Prague Bratislava 14564
Bratislava Vienna 3290
Vienna Budapest 8654
1
```

Output

```
Bratislava Brno
```

Explanation

Refer to the example for Level 3. For this hyperloop connection, one of the specified journeys is faster. This is sufficient, because we are required to make one journey benefit from the hyperloop connection.