Level 8 - System proposal

Your final challenge is to plan a complete hyperloop system.

The hub location will be given. Each hyperloop route must include the hub location precisely once. Only the hub location may be used multiple times in the set of hyperloop routes.

The distance limit applies to the total length of all the routes together.

You should output a hyperloop system

- for which at least N journeys are faster with the hyperloop than currently; and
- which stays within the maximum hyperloop length D.

There may be multiple valid solutions, but you only need to find one.

Notes

The hyperloop system may have at most 100 stops.

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: <HubLocationName>
Single line: <N>
Single line: <D>

Output

All on one line:
<NumberOfHyperloopRoutes>
NumberOfHyperloopRoutes times: *<NumberOfHyperloopLocations>* <HyperloopLocationName> ... <HyperloopLocationName>

Level 8

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
Bratislava
3
500000
```

Output

```
2 3 Vienna Bratislava Budapest 2 Prague Bratislava
```


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