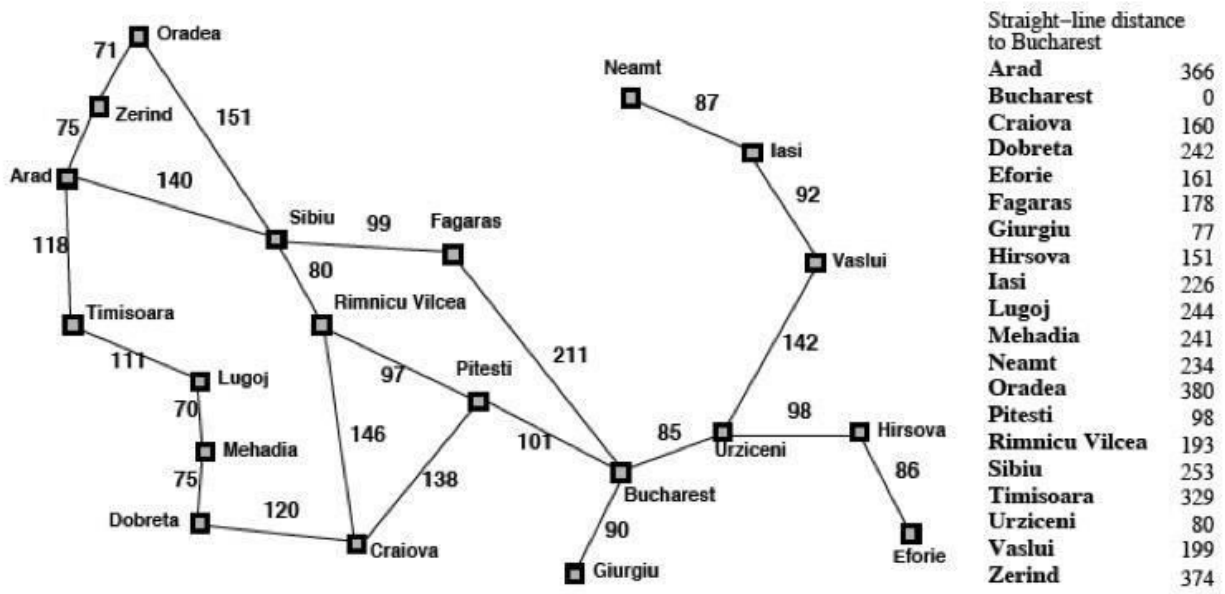

PROBLEM SCENARIO CO2

On holiday, a flight currently wants to travel to Bucharest from Arad. But there is no direct way to Bucharest from Arad. However, the cities are connected with each other like a graph. The distance between the connected cities are given. The flight wants to travel through the most optimal way. To find the optimal path to travel, another information is provided: the straight line distance between any city and the final destination (Bucharest).

Now **apply** A* search to determine the most optimal value for the route Arad to Bucharest and help the flight. *You have to use the straight line distance as the heuristic value for the cities*.

City	Heuristic value	City	Heuristic value
Arad	366	Mehadia	241
Bucharest	0	Neamt	234
Craiova	160	Oradea	380
Eforie	161	Pitesti	100
Fagaras	176	Rimnicu Vilcea	193
Dobreta	242	Timisoara	329
Hirsova	151	Urziceni	80
Iasi	226	Vaslui	199
Lugoj	244	Zerind	374

For simplicity assume these notations

Arad	A	Neamt	F
Bucharest	Z	Oradea	B
Craiova	S	Pitesti	P
Eforie	T	Rimnicu Vilcea	R
Fagaras	O	Timisoara	C
Dobreta	V	Urziceni	D
Hirsova	N	Vaslui	H

Iasi	Q	Zerind	E
Lugoj	G		
Mehadia	L		

INPUTS

Your txt file should take each node followed by each destination it can reach and their corresponding distance and heuristics. You are to read the file then ask the user to input the starting and the destination point.

OUTPUTS

The output will contain the total distance from the starting point to the destination followed by printing the nodes it followed to calculate the distance.

SAMPLE INPUT

In the text file:

Arad 366 Zerind 75 Sibiu 140 Timisoara 118
Zerind 374 Arad 75 Oradea 71
Oradea 380 Zerind 71 Sibiu 151
... ...
Bucharest 0 Pitesti 101 Fagaras 211 Giurgiu 90 Urziceni 85
Giurgiu 77 Bucharest 90
... ... …

The text file is arranged as follows:

Each line starts with a node followed by the heuristic of that node
Then the neighboring nodes and the distance from the parent node is given as a pair
All neighboring city-distance pairs are listed after the heuristic.

For example, the text file starts with Arad which has a heuristic of 366. It is the parent node to Zerind, Sibiu and Timisoara which are 75, 140 and 118 km away from Arad. Notice that since Bucharest is the End node which is why it has a heuristic of 0.

In console:

Start node: Arad
Destination: Bucharest

Sample output

Path: Arad -> Sibiu -> Rimnicu -> Pitesti -> Bucharest
Total distance: 418 km

If there is no path found from the Start node to the End node, simply print “NO PATH FOUND”

Arad 366 Zerind 75 Timisoara 118 Sibiu 140
Craiova 160 Dobreta 120 RimnicuVilcea 146 Pitesti 138
Eforie 161 Hirsova 86
Fagaras 176 Sibiu 99 Bucharest 211
Giurgiu 77 Bucharest 90
Mehadia 241 Lugoj 70 Dobreta 75
Neamt 234 Iasi 87
Sibiu 253 Oradea 151 Arad 140 RimnicuVilcea 80 Fagaras 99
Oradea 380 Zerind 71 Sibiu 151
Pitesti 100 RimnicuVilcea 97 Craiova 138 Bucharest 101
RimnicuVilcea 193 Sibiu 80 Craiova 146 Pitesti 97
Dobreta 242 Mehadia 75 Craiova 120
Hirsova 151 Urziceni 98 Eforie 86
Iasi 226 Vaslui 92 Neamt 87
Lugoj 244 Timisoara 111 Mehadia 70
Timisoara 329 Arad 118 Lugoj 111
Urziceni 80 Bucharest 85 Hirsova 98 Vaslui 142
Vaslui 199 Urziceni 142 Iasi 92
Zerind 374 Oradea 71 Arad 75
Bucharest 0 Fagaras 211 Pitesti 101 Giurgiu 90 Urziceni 85