4. Dinesh

Program Name: Dinesh.java Input File: dinesh.dat

In the recent advanced algorithms unit, Dinesh has learned about the concept of shortest path, where there is an undirected graph of nodes with each edge a certain distance between a pair of nodes, and where the task is to find the shortest distance required to travel between the two nodes.

For example, here is a picture of a graph, and the data that represents it.

```
ONE----4---TWO
| \          |
|   \        |
20    14     8
|       \    |
|         \  |
THREE--5---FOUR
```

The first line of data represents the four nodes of the graph, followed by a value N, then followed by N edge connections between two nodes, stated as the two names followed by an integer representing the distance between that pair of nodes. Following the edge designations is another value M, followed by M pairs of nodes. Between each pair we want to know the shortest path.

The first one is easy since they are adjacent. The distance between ONE and TWO is 4. The next one is a bit more complex since there are three different ways to travel between ONE and THREE. The direct route has a distance of 20, but the route through node FOUR is 19, and even better the route that goes through TWO and FOUR has a distance of 17, clearly the shortest path, even though it seems to be the long way around.

Please help Dinesh as he struggles to code the solution to this problem.

------sample data set-----

```
ONE TWO THREE FOUR
5
ONE TWO 4
ONE THREE 20
THREE FOUR 5
ONE FOUR 14
TWO FOUR 8
5
ONE TWO
ONE THREE
ONE FOUR
THREE FOUR
THREE TWO
```

Input: First will be listed an integer G, indicating G graph data sets to follow. Each graph data set will consist of a row of node names, all on one line, all uppercased, with single space separation. On the next line will be an integer N, followed on the next N lines by a pair of nodes and an integer indicating the distance between that pair of nodes. Finally, an integer M will be followed by M pairs of nodes, between which the shortest path is to be determined.

Output: The pair of nodes in question followed by the shortest path between that pair of nodes, in the exact format shown in the sample output below.

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4. Dinesh (continued)

Sample input:

```
2
ONE TWO THREE FOUR
5
ONE TWO 4
ONE THREE 20
THREE FOUR 5
ONE FOUR 14
TWO FOUR 8
5
ONE TWO
ONE THREE
ONE FOUR
THREE FOUR
THREE TWO
ALPHA BETA GAMMA DELTA EPSILON
6
ALPHA BETA 1
ALPHA GAMMA 7
ALPHA EPSILON 3
BETA EPSILON 6
GAMMA EPSILON 2
EPSILON DELTA 3
3
ALPHA DELTA
BETA GAMMA
EPSILON BETA
```

Sample output:

```
ONE to TWO:4
ONE to THREE:17
ONE to FOUR:12
THREE to FOUR:5
THREE to TWO:13
ALPHA to DELTA:6
BETA to GAMMA:6
EPSILON to BETA:4
```