Single source shortest path, negative weights

Problem ID: shortestpath3
CPU Time limit: 3 seconds
Memory limit: 1024 MB
Difficulty: 5.5

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Input

The input consists of several test cases. Each test case starts with a line with four non-negative integers, $1 \leq n \leq 1000$, $0 \leq m \leq 5000$, $1 \leq q \leq 100$ and $0 \leq s < n$, separated by single spaces, where n is the numbers of nodes in the graph, m the number of edges, q the number of queries and s the index of the starting node. Nodes are numbered from 0 to $n - 1$. Then follow m lines, each line consisting of three (space-separated) integers u, v and w indicating that there is an edge from u to v in the graph with weight $-2000 \leq w \leq 2000$. Then follow q lines of queries, each consisting of a single non-negative integer, asking for the minimum distance from node s to the node number given on the query line.

Input will be terminated by a line containing four zeros, this line should *not* be processed.

Output

For each query, output a single line containing the minimum distance from node s to the node specified in the query, the word "`Impossible`" if there is no path from s to that node, or "`-Infinity`" if there are arbitrarily short paths from s to that node. For clarity, the sample output has a blank line between the output for different cases.

Sample Input 1

```
5 4 3 0
0 1 999
1 2 -2
2 1 1
0 3 2
1
3
4
2 1 1 0
0 1 -100
1
0 0 0 0
```

Sample Output 1

```
-Infinity
2
Impossible

-100
```