HPI Hasso Plattner Institut
IT Systems Engineering | Universität Potsdam

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Sommersemester 2017

Woche 05 – (Adv.) Competitive Programming

Abgabe 22.05.2017 17:00 Uhr, über das Judge-Interface

timetravel: (100 Points - 1 second timelimit)

In some future world, the concept of distance and time is totally messed up. Like in the past, it's still possible to *drive* with a flying car from one city to another one. That still costs some time. But its also possible, to travel in time from one city to another one. That means, if you want to travel from a city to another one, you can end up a bit in the past. To avoid endless time travelling there is a law, that it is not possible to travel in a backward cycle (which would be obviously stupid because at some point there are not time traveling machines anymore). Luckily time travelling machines are really expensive and power consuming, so that only a few cities have this capability.

In the new world, navigation systems are still necessary to find the path from one city to another one. But because of the time traveling machines, new algorithms are necessary. Please help them!

Input The first line of the input contains the amount of nodes n, the amount of edges m and a number k. Each of the following m lines contains an edge, represented by a, b and w (the distance). Please note, that you can not assume, that the distance from a to b is the same as from b to a. Because of the law, there are no negative cycles inside of the graph. Afterwards each of the following k lines contains a question (a b).

$0 < n \leq 700$
$0 < m \leq n^2$
$0 < k \leq m$
$0 \leq a, b < n$
$-100.000 \leq w \leq 100.000$

Output Please print for each question the shortest distance between the cities a and b. Print $\circ\circ$ if there is no path from a to b.

Points There are three groups of test sets:

- *e(asy)*: For the first group worth 30 Points, you can assume, that the time traveling system is broken and $0 < w \leq 1000$. Also that $n \leq 200$ and there is always a path from a to b.
- *m(edium)*: For the second group worth 30 Points, you can assume, that $n \leq 400$ and there is always a path from a to b.
- *h(ard)*: For the third group of test sets worth 40 Points, there are no additional assumptions.

Sample Input

```
6 11 11
1 3 8
0 1 6
1 4 9
0 2 -1
0 4 1
4 1 8
3 0 1
5 1 1
3 1 1
3 4 5
2 4 4
1 3
0 2
0 4
4 1
4 2
4 3
2 0
3 4
2 4
1 2
3 5
```

Sample Output

```
8
-1
1
8
16
16
21
2
4
8
oo
```