Jogging

Type	Input file	Output file	Time limit	Memory limit
Batch	stdin	stdout	1 second	128 MB

Statement

Gotham City is holding a marathon. Gotham is a city of N intersections, numbered 1 to N, and M one-way streets of varying length. *The Nightlight* is training for the marathon and wishes to find a suitable jogging route. A jogging route starts at *The Nightlight*'s home at intersection 1, passes through some roads and ends at intersection 1. Intersections and roads can be visited multiple times in a route.

The Nightlight is very lazy and wants to find the shortest jogging route. However at the same time, there are some intersections she would like to visit. Hence for each intersection i ($2 \leq i \leq N$) please tell *The Nightlight* the length of the shortest route starting and ending on intersection 1 which passes through intersection i.

Input

The first line contains 2 integers N M. The next M lines each contain 3 integers u_i v_i w_i, indicating there is an one way street from intersection u_i to intersection v_i of length w_i kilometers.

Output

Write $N-1$ lines, the ith of which ($1 \leq i < N$) contains 1 integer, the shortest route passing intersections 1 and $i+1$, in kilometers. If no route exists, output -1 for that line.

Sample Input

```
5 7
1 2 1
2 3 2
3 4 3
4 1 4
3 1 6
1 3 10
1 5 1
```

Sample Output

```
9
9
10
-1
```

Explanation

The shortest route for intersections 2,3 goes from intersections $1 \to 2 \to 3 \to 1$ and has length 1+2+6=9 kilometers. For intersection 4 the shortest route goes from intersections $1 \to 2 \to 3 \to 4 \to 1$ and has length 1+2+3+4=10 kilometers. For intersection 5 no route exists, so -1 is the output.

Constraints

- $2 \leq N \leq 10^5$
- $2 \leq M \leq 3 \times 10^5$
- $1 \leq u_i, v_i \leq N$ for all i
- $1 \leq w_i \leq 10^4$ for all i
- $u_i \neq v_i$ for all i and for any (a, b) at most 1 road goes from intersections a to b

Subtasks

Number	Points	Max N	Other Constraints
1	20	200	None
2	20	100000	If there is a road from a to b there is also a road from b to a of same length
3	20	100000	$w_i = 1$ for all i
4	40	100000	None