Shortest Path with Negative Edge

Time limit: 1 sec

Given a directed graph G and a starting vertex **s**, your task is to calculate a shortest distance from **s** to every vertices. The graph has **N** vertices, numbered from 0 to **N**-1. There are **E** weighted directed edges with possibly negative weight.

Since a negative edge is possible, the graph might contain a negative cycle. Your program should be able to detect this case as well.

Input

- The first line of input contains three integers **N**, **E** and **s** ($1 \le N <= 100$; $0 \le s < N$).
- The next **E** lines contains the edge. Each line has three integers **a**, **b** and **c** indicating that there is an edge from **a** to **b** with weight **c**. The weight is an integer between -1,000 and 1,000, inclusively.

Output

The output must contain exactly one line that contains **N** integers. Each integer is the shortest distance from **s** to each vertex, starting from the vertex 0 to vertex **N**-1. If the graph has negative cycle, the line should contain only one number, -1.

Example

Input	Output
4 3 0 0 1 -1 1 2 1 2 3 4	0 -1 0 4
4 3 0 1 2 -1 2 3 -1 3 1 -1	-1