All Pairs Shortest Path

Time limit: 0.4s **Memory limit:** 512M
Java: 2.0s

You are given a graph with N vertices and M edges. Each edge is a directed edge from vertex u_i to vertex v_i with weight w_i. You are asked to find the shortest path between all pairs of vertices. The graph may contain multiple edges between any pair of vertices, as well as self-loops. There may also be negative edge weights. It is not guaranteed that the graph is connected.

Constraints

For all subtasks:

$0 \leq M \leq 4\,000$

$1 \leq u_i, v_i \leq N$

Subtask 1 [10%]

$1 \leq N \leq 300$

$-10^9 \leq w_i \leq 10^9$

Subtask 2 [10%]

$1 \leq N \leq 1\,000$

$1 \leq w_i \leq 10^9$

Subtask 3 [80%]

$1 \leq N \leq 1\,000$

$-10^9 \leq w_i \leq 10^9$

Input Specification

The first line contains 2 integers N and M, subject to the constraints above.

The next M lines describe the edges of the graph. Each line contains 3 integers, u_i, v_i, w_i, indicating a directed edge from vertex u_i to vertex v_i with weight w_i, subject to the constraints above.

Output Specification

This problem is graded with an `identical` checker. This includes whitespace characters. Ensure that every line of output is terminated with a `\n` character.

The output consists of N lines, each with N space separated integers. Each line should end with a new line character. Integer j on line i contains the distance of the shortest path from vertex i to vertex j.

If there is no path from i to j, `INF` should be printed instead of an integer.

If there is no lower bound on the length of the shortest path from i to j (or equivalently, there is a path from i to j that contains a negative edge cycle), `-INF` should be printed instead of an integer.

A negative edge cycle is a path that starts and ends on the same vertex, and the sum of the weights of those edges on that path is less than 0.

Sample Input 1

```
5 4
1 2 9
1 4 8
2 4 2
3 5 4
```

Sample Output 1

```
0 9 INF 8 INF
INF 0 INF 2 INF
INF INF 0 INF 4
INF INF INF 0 INF
INF INF INF INF 0
```

Sample Input 2

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

Sample Output 2

```
0 2 -8 INF -INF -INF
INF 0 -10 INF -INF -INF
INF INF 0 INF -INF -INF
INF INF INF 0 INF INF
INF INF INF INF -INF -INF
INF INF INF INF -INF -INF
```