Single Source Shortest Path (Negative Edges)

(sssp_III.cpp/c)

Time Limit: 1 sec , Memory Limit: 131072 KB

Input (sssp_III.in)

An edge-weighted graph G(V, E) and the source r.

```
|V| |E| r
s_0 t_0 d_0
s_1 t_1 d_1
:
s_{|E|-1} t_{|E|-1} d_{|E|-1}
```

|V| is the number of vertices and |E| is the number of edges in G. The graph vertices are named with the numbers 0, 1,..., |V| - 1 respectively. r is the source of the graph.

 s_i and t_i represent source and target vertices of i-th edge (directed) and d_i represents the cost of the i-th edge.

Output (sssp_III.out)

If the graph contains a negative cycle (a cycle whose sum of edge costs is a negative value) which is reachable from the source r, print

```
NEGATIVE CYCLE
```

in a line.

Otherwise, print

```
c_0
c_1
:
c_{|V|-1}
```

The output consists of |V| lines. Print the cost of the shortest path from the source r to each vertex 0, 1, ... |V| - 1 in order. If there is no path from the source to a vertex, print "INF".

Constraints

- $1 \le |V| \le 1000$
- $0 \le |E| \le 2000$
- $-10000 \le d_i \le 10000$
- · There are no parallel edges
- There are no self-loops

Sample Input 1

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

Sample Output 1

```
0
2
-3
-1
```

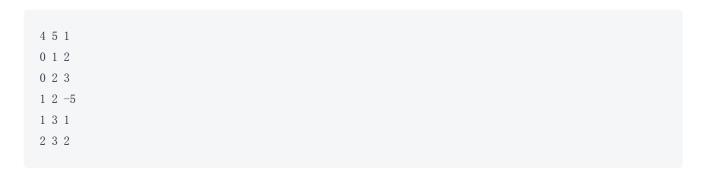
Sample Input 2

```
4 6 0
0 1 2
0 2 3
1 2 -5
1 3 1
2 3 2
3 1 0
```

Sample Output 2

NEGATIVE CYCLE

Sample Input 3



Sample Output 3

```
INF
0
-5
-3
```