

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
s0 t0 d0
s1 t1 d1
:
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 $0, 1, \dots, |V| - 1$ 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

```
c0
c1
:
c|V|-1
```

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

Constraints

- $1 \leq |V| \leq 1000$
- $0 \leq |E| \leq 2000$
- $-10000 \leq d_i \leq 10000$
- 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

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

Sample Output 3

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