IOI Training Camp 2014 – Test 2, 2 May, 2014

Problem 2 Ants

You are given a directed graph with n vertices, labeled 1 to n. The edges of the graph contain values, and each time you traverse an edge, the value of that edge gets added to your total score. If the same edge is traversed multiple times, its value gets added every time. Values can be any number between -499 and 499, inclusive. There are no edges that connect a vertex to itself.

There is an ant at vertex 1 and it wants to get to vertex 2. It must do this in an integer number of seconds between 1 and `timeLimit`, inclusive. The ant must make exactly `stepsPerSecond` steps each second, where each step consists of moving from its current vertex V to an adjacent vertex W (W is adjacent to V if there is a directed edge from V to W in the graph). The ant's goal is to get the highest score possible.

If it is impossible to reach vertex 2 under the given constraints, output `IMPOSSIBLE`.

Input format

- The first line contains 3 integers: n, `stepsPerSecond` and `timeLimit`.
- n lines follow with n integers each.

  The ith integer in the $(j+1)$th line is $W[i][j]$. If $W[i][j]$ is -999, then there is no edge from i to j. Else, there is an edge from i to j, and its weight is $W[i][j]$.

Output format

If it is impossible to reach vertex 2 under the given constraints, output `IMPOSSIBLE`. Otherwise, output one integer (take care to avoid overflows), the highest score possible.

Test data

For all subtasks, $1 \leq n \leq 50$, $1 \leq$ `stepsPerSecond` ≤ 100, $1 \leq$ `timeLimit` $\leq 10^9$.

- **Subtask 1 (30 marks)** $1 \leq$ `stepsPerSecond` $\times$ `timeLimit` $\leq 10^4$.
- **Subtask 2 (70 marks)** No additional constraints.

Sample input 1

```
2 3 2
-999 1
1 -999
```

Sample output 1

```
3
```

Sample input 2

```
2 2 3
-999 1
1 -999
```

Sample output 2

```
IMPOSSIBLE
```

Sample input 3

```
4 7 9
-999 1 1 -999
-999 -999 -999 -999
-999 -999 -999 1
1 -999 -999 -999
```

Sample output 3

```
49
```

Limits

- *Memory limit* : 256 MB
- *Time limit* : 2s