Problem G. Lexicographically Minimum Walk

Input file:	*standard input*
Output file:	*standard output*
Time limit:	2 seconds
Memory limit:	1024 mebibytes

There is a directed graph G with N nodes and M edges. Each node is numbered 1 through N, and each edge is numbered 1 through M. For each i ($1 \leq i \leq M$), edge i goes from vertex u_i to vertex v_i and has a **unique** color c_i.

A *walk* is defined as a sequence of edges e_1, e_2, $\cdots$, e_l where for each $1 \leq k < l$, v_{e_k} (the tail of edge e_k) is the same as $u_{e_{k+1}}$ (the head of edge e_{k+1}). We can say a walk $e_1, e_2, \cdots, e_l$ starts at vertex u_{e_1} and ends at vertex v_{e_l}. Note that the same edge can appear multiple times in a walk.

The *color sequence* of a walk $e_1, e_2, \cdots, e_l$ is defined as $c_{e_1}, c_{e_2}, \cdots, c_{e_l}$.

Consider all color sequences of walks of length at most 10^{100} from vertex S to vertex T in G. Write a program that finds the lexicographically minimum sequence among them.

Input

The first line of the input contains four space-separated integers N, M, S, and T ($1 \leq N \leq 100\,000$, $0 \leq M \leq 300\,000$, $1 \leq S \leq N$, $1 \leq T \leq N$, $S \neq T$).

Then M lines follow: the j ($1 \leq j \leq M$)-th of them contains three space-separated integers u_i, v_i and c_i ($1 \leq u_i, v_i \leq N$, $u_i \neq v_i$, $1 \leq c_i \leq 10^9$); it describes a directional edge from vertex u_i to vertex v_i with color c_i.

The graph doesn't have multiple edges and each edge has a unique color. Formally, for any $1 \leq i < j \leq M$, $c_i \neq c_j$ and $(u_i, v_i) \neq (u_j, v_j)$ holds.

Output

If there is no walk from vertex S to vertex T, print "`IMPOSSIBLE`". (without quotes)

Otherwise, let's say $a_1, a_2, \cdots, a_l$ is the lexicographically minimum sequence among all color sequences of length at most 10^{100} from vertex S to vertex T.

- If $l \leq 10^6$, print $a_1, a_2, \cdots, a_l$ in the first line. There should be a space between each printed integer.
- If $l > 10^6$, print "`TOO LONG`". (without quotes)

Examples

standard input	standard output
3 3 1 3 1 2 1 2 3 7 1 3 5	1 7
3 4 1 3 1 2 1 2 1 2 2 3 7 1 3 5	TOO LONG
2 0 2 1	IMPOSSIBLE

Note

Sequence $p_1, p_2, \cdots, p_n$ is lexicographically smaller than another sequence $q_1, q_2, \cdots, q_m$ if and only if one of the following holds:

- There exists a unique j $(0 \leq j < \min(n, m))$ where $p_1 = q_1$, $p_2 = q_2$, $\cdots$, $p_j = q_j$ and $p_{j+1} < q_{j+1}$.
- $n < m$ and $p_1 = q_1$, $p_2 = q_2$, $\cdots$, $p_n = q_n$. In other words, p is a strict prefix of q.