Problem B. Graph and Machine

Input file:	`standard input`
Output file:	`standard output`
Time limit:	4 seconds
Memory limit:	512 mebibytes

John's father recently passed away and left John a colored graph and a machine. The colored graph was simply a connected undirected graph with labels 0 or 1 on each of its vertices. The machine was something more peculiar.

A machine of order n is an acyclic directed graph with one source (a vertex with no incoming edges) and two sinks (vertices with no outgoing edges). One of the sinks is labeled with 0 and the other is labeled with 1. Each of the remaining vertices including the source is labeled with an integer from $\{1, \ldots, n\}$ and has exactly two outer edges: one labeled with 0 and the other labeled with 1. Also **on every path from the source to a sink, all labels of the non-sink vertices are distinct**.

A machine of order n computes a function from $\{0,1\}^n$ to $\{0,1\}$. Let us define it recursively. For 0-sink, the function is 0 on every input, for 1-sink, it is 1 for every input. For a non-sink vertex v labeled with i,

$$f_v(x_1, \ldots, x_n) = \begin{cases} f_{t_0}(x_1, \ldots, x_n) & \text{if } x_i = 0 \\ f_{t_1}(x_1, \ldots, x_n) & \text{if } x_i = 1 \end{cases}$$

where t_j is the end of the edge from v labeled with j for $j \in \{0,1\}$. The function calculated by a machine with the source s is f_s.

In his will, Jonh's father wrote that he had worked on the machine for years in order to calculate the edge-coloring function of the colored graph he had given to John. All he asks John is to check if the machine calculates this function correctly.

The edge-coloring function $\text{EC}(x_1, \ldots, x_m)$ of a colored graph G with ℓ vertices and m edges with vertex-labels $c_1, \ldots, c_\ell$ is a function from $\{0,1\}^m$ to $\{0,1\}$. It equals 1 if and only if for every vertex v with incident edges $e_1, \ldots, e_k$, the following equality holds: $c_v = \bigoplus_{i=1}^{k} x_{e_i}$. In other words, the parity of the sum of values on edges incident to v is c_v.

You are asked to check if the given machine calculates the edge-coloring function of the given graph, and if it is not, find the coloring of edges x such that $\text{EC}(x) \neq f(x)$, where f is the function calculated by the machine.

Input

The first line contains five integers N, m, s, t_0, and t_1: the number of nodes in the machine, the order of the machine, the index of the source and the indices of the 0-sink and 1-sink respectively ($1 \le s, t_0, t_1 \le N \le 300\,000$; $N \ge 3$; $1 \le m \le 300\,000$; $t_0 \ne t_1$; $s \ne t_0$; $s \ne t_1$). The i-th of the next N lines describes the i-th node of the machine. It contains three integers o_0, o_1 and ℓ: the index of the end node of the outer edge from the node i labeled with 0, this index for the edge labeled with 1, and the label of the node i itself ($-1 \le o_0, o_1 \le N$; $-1 \le \ell \le m$). If i is a sink, $o_0 = o_1 = \ell = -1$. The values o_0, o_1 and ℓ are never equal to zero.

It is guaranteed that

- the graph of the machine is acyclic;
- o_0, o_1 or ℓ are equal to -1 if and only if the node is a sink;
- on every path from the source to a sink, all labels of non-sink vertices are unique;
- all vertices except maybe one of the sinks are reachable from s.

The next line contains one integer k, the number of vertices in the colored graph G ($1 \le k \le 300\,000$). The number of edges in this graph is m. The following line contains k integers $c_1, c_2, \ldots, c_k$, the labels of the vertices of G (each c_i is either 0 or 1).

The last m lines contain descriptions of the edges of G. The i-th of these lines contains two integers a_i and b_i which describe an edge connecting a_i and b_i ($1 \le a_i, b_i \le k$; $a_i \ne b_i$). It is guaranteed that G is connected, but it may contain parallel edges.

Output

Print "YES" on the first line if the machine calculates the edge-coloring function correctly. Otherwise, print "NO" on the first line, and on the next line, print m characters $x_1, x_2, \ldots, x_m$ such that $\mathrm{EC}(x_1, x_2, \ldots, x_m) \ne f(x_1, x_2, \ldots, x_m)$, where f is the function computed by the machine. Each x_i must be either 0 or 1.

Examples

standard input	standard output
7 3 1 6 7 2 3 1 6 4 2 5 6 2 6 7 3 7 6 3 -1 -1 -1 -1 -1 -1 3 1 1 0 1 2 1 3 2 3	YES
7 3 1 6 7 2 3 1 6 4 2 5 6 2 6 7 3 6 7 3 -1 -1 -1 -1 -1 -1 3 1 1 0 1 2 1 3 2 3	NO 101
3 1 1 2 3 2 3 1 -1 -1 -1 -1 -1 -1 2 1 1 1 2	YES