Problem A. Abstract

Input file:	*standard input*
Output file:	*standard output*
Time limit:	2 seconds
Memory limit:	256 mebibytes

You have a DAG (Directed Acyclic Graph) with n nodes and m edges. The graph has exactly one node x that has no outgoing edges. The i-th node has an integer value a_i in it.

Every second, the following happens:

- For each node i, let $b_i = a_i$.
- For each node i, let $a_i = 0$.
- For each node i, and each node j such that there is an edge from i to j, the value b_i is added to a_j.
- The value $\left\lfloor \frac{b_x}{2} \right\rfloor$ is added to a_x.

Find the first moment of time when all a_i become 0. Since the answer can be very large, output it modulo 998 244 353.

Input

The first line contains two integers n and m ($1 \le n \le 10^4$; $1 \le m \le 10^5$): the number of vertices and edges in the graph.

The second line contains n integers $a_1, a_2, \ldots, a_n$ ($0 \le a_i \le 10^9$): the values in the vertices.

Each of the following m lines contains two integers u and v ($1 \le u, v \le n$) which represent a directed edge from u to v.

It is guaranteed that the graph is a DAG with no multi-edges, and there is exactly one node that has no outgoing edges.

Output

Print a line with a single integer: the first moment of time when all a_i become 0, modulo 998 244 353.

Examples

standard input	*standard output*
3 2 1 1 1 1 2 2 3	3
6 8 1 1 4 5 1 4 1 4 1 5 2 3 2 5 3 4 4 5 4 6 5 6	8
5 6 7 2 3 6 6 1 2 1 4 2 3 3 4 3 5 4 5	9

Note

Hi, so to me seems like a notorious coincidence. (Codeforces 1704E)