beCP

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Task 1.2: Limited power (power)

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Time limit: 3 s   Memory limit: 1024 MB

As a new electricity supplier, you built your own electricity network between your customers' houses and the power plant. Each house can either be directly connected by a cable to the power plant, or be connected by a cable to a pylon. The pylon can either be directly connected by a cable to the power plant, or be connected by a cable to another pylon, and so on until the power plant... Figure 1 illustrates a possible situation: the power plant has number 0, the houses have numbers $1-4$, and the intermediate pylons have numbers $5-7$.

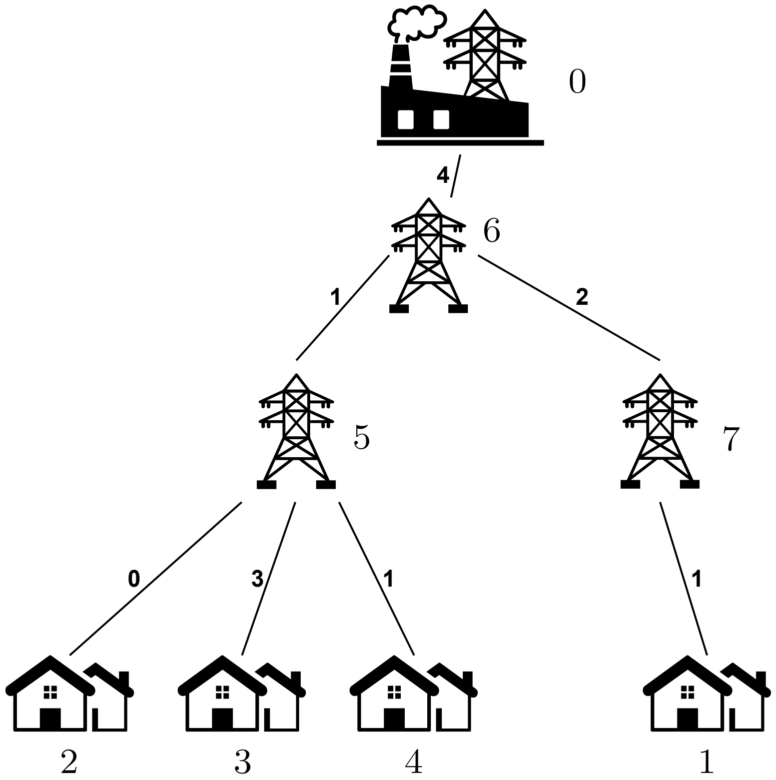

Figure 1: Illustration

Each cable can withstand a limited amount of power. On the illustration, this is the number written next to each cable. Each house uses 1 (unit of) power: to connect a house to the power plant, you need to allocate 1 power on each cable connecting the house to the power plant. If this is not possible, the customer cannot be satisfied, and you do not allocate any power to him. In the example, to connect house 1 to the power plant, the power has to pass through pylons 7 and 6, and each of the three cables must have available power.

You try to satisfy as many customers as possible, starting with the first ones that registered at your company (lower house number). How many customers can you satisfy, and what will the allocated power on each cable be?

Input

The first line contains two integers N and M: the number of customers and the number of nodes in the network, respectively. By nodes, we mean the power plant, the N houses, and possibly the pylons. The nodes are numbered from 0 to $M-1$. The power plant always has number 0, and the houses always have numbers $1-N$.

Each of the following $M-1$ lines contains two integers p_i and c_i: the parent of node i in the direction of the power plant, and the maximum power on the cable connecting i and p_i, respectively, for i ranging from 1 to $M-1$.

Output

First, print the number of customers that can be connected to the power plant. Then, print $M-1$ lines: for each cable (in the input order), print the power allocated on that cable.

General limits

- $1 \leq N \leq 5 \times 10^5$, the number of customers.
- $N+1 \leq M \leq 5 \times 10^5$, the number of nodes on the network.
- $0 \leq c_i \leq 100$, the maximum power on the cable connecting nodes i et p_i. Note that the power can be 0 if the cable is defective.
- $0 \leq p_i \leq M-1$, the parent of node i.
- The houses, i.e. nodes 1 to N, are never parents of other nodes.
- Each pylon is the parent of at least 1 node.

Additional constraints

Subtask	Points	Constraints
A	20	$M = N + 1$.
B	20	Except for the power plant, each node is the parent of at most 1 node.
C	20	$M \leq 10^4$.
D	40	No additional constraint.

Example 1

sample1.in
```
3 4
0 1
0 0
0 3
```

sample1.out
```
2
1
0
1
```

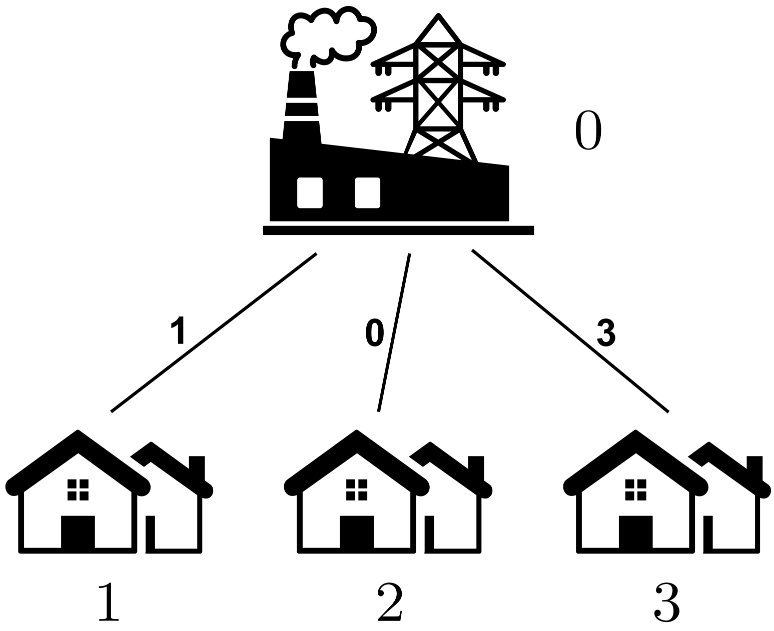

Figure 2: Illustration of example 1

This example is illustrated on Figure 2. House 1 can be connected. Then, house 2 cannot be connected due to the cable with power 0. Finally, house 3 can be connected.

The allocated power on the cables is thus 1, 0, 1.

This example is valid for all subtasks.

Example 2

sample2.in

```
4 8
7 1
5 0
5 3
5 1
6 1
0 4
6 2
```

sample2.out

```
2
1
0
1
0
1
2
1
```

This example is illustrated on Figure 1. Only houses 1 and 3 are connected to the network.

This example is only valid for subtasks C and D.