

TLE '17 Contest 5 P6 - Circuits

Time limit: 1.0s **Memory limit:** 256M

There is a circuit with N input gates, and M MOOSE gates.

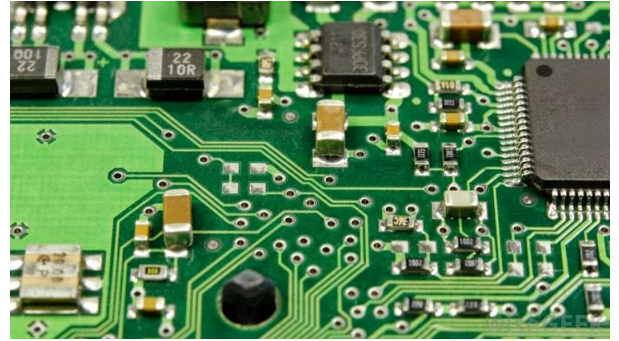
A MOOSE gate computes the negation of the AND of the inputs. That is, it outputs 0 if both inputs are 1, otherwise it outputs 1.

The gates are numbered $1, \dots, N + M$ starting with the N input gates. Gate number $N + M$ is the output gate.

Each MOOSE gate's input is from two gates with smaller IDs.

At the moment, all inputs have the same value x , which is unknown, but can either have the value 0 or 1.

You want to change as many of the inputs to fixed values (0 or 1) instead of x as possible so that the output of the circuit (the value of gate $N + M$) is the same as the output before fixing any inputs. That is, if y_0 is produced when $x = 0$ and y_1 is produced when $x = 1$, then the fixed circuit should still produce y_0 when $x = 0$ and y_1 when $x = 1$. Output one such optimal choice of hard-wiring.



A generic circuit.

Constraints

For all subtasks:

$$1 \leq N \leq 10^5$$

$$1 \leq M \leq 2 \times 10^5$$

Subtask	Points	Additional Constraints
1	10	$N \leq 5, M \leq 50$
2	30	$N \leq 2 \times 10^2, M \leq 2 \times 10^4$
3	60	No additional constraints.

Input Specification

The first line of input will contain two space-separated integers, N and M .

The next line of input will contain $2M$ space-separated integers. The $2i - 1^{\text{th}}$ and $2i^{\text{th}}$ integers specify the inputs to gate $N + i$. These integers are guaranteed to be positive and less than $N + i$.

Output Specification

Output a single line with N characters, denoting an optimal assignment. The i^{th} character can either be `0` (set to false), `1` (set to true), or `x` (set to x). If there are multiple solutions, output any of them.

Sample Input 1

```
2 1
1 2
```

Sample Output 1

```
x1
```

Sample Input 2

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

Sample Output 2

```
10x
```

Sample Input 3

```
4 18
1 1 2 2 5 6 1 2 7 8 9 9 3 3 4 4 11 12 3 4 13 14 15 15 10 10 16 16 17 18 10 16 19 20 21 21
```

Sample Output 3

```
0000
```