Problem E. Expand the Logical Formula

Input file:	*standard input*
Output file:	*standard output*
Time limit:	15 seconds
Memory limit:	1024 mebibytes

This problem is about the special case of the Satisfiability Problem (SAT). Let us introduce the definition of SAT first.

A *SAT instance* is a boolean logic formula consisting of several boolean variables combined by AND ($\wedge$), OR ($\vee$), and NOT ($\neg$) operators and parentheses. An *assignment* is a mapping from variables to boolean values. An assignment is *satisfying* a formula if and only if the formula is evaluated to be true with this assignment. A *literal* is either a variable or its negation. A *clause* is a list of literals concatenated with OR. A formula is in *Conjunctive Normal Form* (CNF) if it consists of clauses concatenated with AND. In the following, we only consider CNF formulae as SAT inputs because every formula can be converted to an equivalent CNF formula.

2-SAT is a special case of SAT where the length of clauses is limited to 2. For example, $(x \vee y) \wedge (\neg x \vee z)$ is a 2-SAT instance consisting of 3 variables and 2 clauses. The assignment $x = \texttt{false}$, $y = \texttt{true}$, $z = \texttt{true}$ is one of the satisfying assignments for this formula.

You are given a 2-SAT instance in CNF with N variables and M clauses. The i-th variable is denoted by x_i and this i is called its index. In all clauses, the difference between the indices of the two variables is less than or equal to 2.

Let C_k be the number of satisfying assignments where exactly k variables are true. Your task is to write a program that calculates C_k for all k from 0 to N. Since the answers may be huge, find them modulo 998 244 353.

Input

The first line of the input consists of two integers, the number of variables N ($1 \le N \le 100\,000$) and the number of clauses M ($1 \le M \le 100\,000$).

The following M lines represent the clauses in the 2-SAT instance. The i-th of them corresponds to the i-th clause and contains two integers A_i and B_i representing the literals in this clause. They satisfy $1 \le |A_i|, |B_i| \le N$ and $||A_i| - |B_i|| \le 2$, and each of them has the following meaning: If it is a positive integer a, the literal is x_a (without negation). If it is a negative integer b, the literal is $\neg x_{-b}$ (with negation).

Output

Output $N + 1$ lines. The i-th line must contain a single integer: the value $C_{i-1} \bmod 998\,244\,353$.

Examples

standard input	*standard output*
4 2 1 -3 2 2	0 1 2 2 1
3 6 1 2 2 3 2 -1 1 3 2 -3 -2 3	0 0 1 1