

Problem J. Foreign Currency Exchange

Input file: *standard input*
Output file: *standard output*
Time limit: 5 seconds
Memory limit: 512 mebibytes

You are at the foreign currency exchange center, and there are N currencies.

The exchange rates are presented in a table with four columns. You can see an example of such table below.

RUB	EUR	4785	100
EUR	USD	100	132
USD	JPY	959	100000

That means that you can exchange 4785 RUB to 100 EUR and, vice versa, 100 EUR to 4785 RUB.

The foreign currency exchange center has no extra exchange fee.

Given the table, you are to find the classes of exchange rate equivalence for all currencies. In other words, you need to assign an integer label for each currency in such a way that there is a one-to-one exchange rate between two currencies iff they share the same label.

The table at the exchange center contains no ambiguities and contradictions. And it is possible to calculate the exchange rate between any two of the N currencies with the help of this table.

Input

The first line contains integers N and M ($1 \leq N \leq 10^5, 1 \leq M \leq 10^6$) — the number of currencies at the exchange center and the number of rows in the exchange rate table respectively.

The next M lines describe the exchange rate table.

Each of the lines contains exactly four integer numbers u, v, w_u, w_v meaning that you can exchange w_u units of currency u to w_v units of currency v ($1 \leq u, v \leq N, 1 \leq w_u, w_v \leq 3 \cdot 10^6$).

Output

Output N integers c_1, c_2, \dots, c_n , where c_i is the label of the exchange rate equivalence class of the currency i ($1 \leq c_i \leq N$).

Example

standard input	standard output
6 7	1
1 2 7 2	2
1 3 1 1	1
2 4 2 7	1
2 3 2 7	2
3 5 7 2	2
3 6 7 2	
4 6 7 2	