Problem X: Maximum Satisfiability

Problem Description

You are given n Boolean variables $x_1, \dots, x_n$, each taking a value in $\{0, 1\}$, and m weighted clauses $C_1, C_2, \dots, C_m$ with corresponding weights $w_1, \dots, w_m$. A *literal* is either a variable x_i or its negation $\neg x_i$. A *clause* is a disjunction (logical "or") of one or more literals, and a Boolean formula in *conjunctive normal form (CNF)* is the conjunction (logical "and") of all clauses:

$$\phi = C_1 \wedge C_2 \wedge \cdots \wedge C_m.$$

The formula ϕ is said to be *satisfiable* if there exists an assignment of truth values to variables that makes all clauses true. Your task is to determine whether ϕ is satisfiable. If it is not satisfiable, find the maximum total weight of clauses that can be simultaneously satisfied by some truth assignment.

Input

The first line contains two integers n and m ($1 \leq n \leq 20$, $0 \leq m \leq 100$).

Each of the next m lines describes one clause. The line begins with an integer ℓ ($1 \leq \ell \leq 20$), the number of literals in the clause, followed by a positive integer w ($0 < w \leq 10^6$), the weight of the clause, followed by ℓ integers representing the literals themselves.

A positive integer i denotes the literal x_i, while a negative integer $-i$ denotes the literal $\neg x_i$. Variable indices are 1-based.

Output

Print a single line:

- `satisfiable` if there exists a truth assignment that satisfies all clauses, or
- `not satisfiable W` otherwise, where `W` is the maximum total weight of simultaneously satisfiable clauses.

Examples

Sample Input 1

```
3 2
2 1 1 -2
1 2 3
```

Sample Output 1

```
satisfiable
```

Sample Input 2

```
3 3
2 5 1 2
1 4 -1
1 3 -2
```

Sample Output 2

```
not satisfiable 9
```