

Problem Description

You are given a CNF-formula as input, output the truth table for the formula.

Input Format (the same with problem A)

The first line will consist of an integer T , the number of test cases.

T cases follow. For each case:

The first line will consist of two integers C and N , separated by a space, which represent the number of clauses and variables respectively.

C lines follow. Each line describes each clause. Each clause has the following format:

The first integer K describes the number of literals in that clause. The next K integers describe the literals. The number i represents literal x_i if $i > 0$, or literal $\neg x_i$ if $i < 0$.

For example, $(x_1 \vee x_3 \vee \neg x_4)$ will be written as 3 1 3 -4 .

Output Format

For each case, you have to output in the following format:

There will be 2^N lines.

The first line will consist of the value of the formula given that $(x_1 = 0, x_2 = 0, x_3 = 0, \dots, x_N = 0)$.

The second line will consist of the value of the formula given that $(x_1 = 0, x_2 = 0, x_3 = 0, \dots, x_N = 1)$.

The third line will consist of the value of the formula given that $(x_1 = 0, x_2 = 0, x_3 = 0, \dots, x_{N-1} = 1, x_N = 0)$.

The fourth line will consist of the value of the formula given that $(x_1 = 0, x_2 = 0, x_3 = 0, \dots, x_{N-1} = 1, x_N = 1)$.

...

The 2^N th line will consist of the value of the formula given that $(x_1 = 1, x_2 = 1, x_3 = 1, \dots, x_N = 1)$.

Input Sample

1

3 4

2 1 2

2 -2 3

3 2 3 -4

Output Sample

0
0
0
0
0
0
1
1
1
0
1
1
0
0
1
1

Explanation

The formula in the input sample can be written as

$(x_1 \vee x_2) \wedge (-x_2 \vee x_3) \wedge (x_2 \vee x_3 \vee -x_4)$.

Below is the truth table for the formula given in the sample input

| x_1 | x_2 | x_3 | x_4 | $(x_1 \vee x_2)$ | $(-x_2 \vee x_3)$ | $(x_2 \vee x_3 \vee -x_4)$ | $(x_1 \vee x_2) \wedge (-x_2 \vee x_3) \wedge (x_2 \vee x_3 \vee -x_4)$ |
|-------|-------|-------|-------|------------------|-------------------|----------------------------|---|
| 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 |
| 0 | 0 | 0 | 1 | 0 | 1 | 0 | 0 |
| 0 | 0 | 1 | 0 | 0 | 1 | 1 | 0 |
| 0 | 0 | 1 | 1 | 0 | 1 | 1 | 0 |
| 0 | 1 | 0 | 0 | 1 | 0 | 1 | 0 |
| 0 | 1 | 0 | 1 | 1 | 0 | 1 | 0 |
| 0 | 1 | 1 | 0 | 1 | 1 | 1 | 1 |
| 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| 1 | 0 | 0 | 0 | 1 | 1 | 1 | 1 |
| 1 | 0 | 0 | 1 | 1 | 1 | 0 | 0 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 1 | 0 | 1 | 0 | 1 | 1 | 1 | 1 |
| 1 | 0 | 1 | 1 | 1 | 1 | 1 | 1 |
| 1 | 1 | 0 | 0 | 1 | 0 | 1 | 0 |
| 1 | 1 | 0 | 1 | 1 | 0 | 1 | 0 |
| 1 | 1 | 1 | 0 | 1 | 1 | 1 | 1 |
| 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |

Constraint

Time Limit: 2s

$1 \leq T \leq 10$

$1 \leq N \leq 15$

$1 \leq C \leq 100$

Each clause consists of at least 2 literals and at most 4 literals.

Your output should not consists of more than 1000 gates.

Score – (Max Score: 37)

There will be two test files for this problem.

Test file 1 (17 points)

There will be additional constraint for this test file: Each clause consist of **exactly** 2 literals.

Test file 2 (20 points)

No additional constraint.

Note

Java version used is "gcj-java-3.2.2".

C++ version used is "g++ 4.4.7".