The Wheels on the Bus

South-park Elementary is going on a picnic. There are n students and k buses to transport them to the picnic spot. The students are numbered from 1 to n, and the buses are numbered from 1 to k.

To ensure that all students are happy, Mr. PC Principal has asked for their opinions. There are a total of m opinions, each of which can be of two types:

- $1 \;\; x \;\; y$: student x and student y cannot sit on the same bus.
- $2 \;\; x \;\; y \;\; z$: if student x is in bus z, then student y must also be in bus z, or vice versa. In other words, either both students are in bus z or neither of them is in bus z.

Your task is to determine the number of ways to assign each student to a bus such that all of the opinions are respected. Two assignments are considered different if there is at least one student who is assigned to different buses.

Note that a bus can be empty, meaning that no student is assigned to it. It can also have all the students assigned to it.

Input

Read the input from the standard input in the following format:

- line 1: $n \;\; k \;\; m$
- line $1 + i$ ($1 \leq i \leq m$): this line describes opinion i and follows one of the following formats:
  - $1 \;\; x \;\; y$
  - $2 \;\; x \;\; y \;\; z$

Output

Write the output to the standard output in the following format:

- line 1: the number of ways to assign each student to a bus such that all the opinions are satisfied

Constraints

- $1 \leq n \leq 17$
- $2 \leq k \leq 5$
- $0 \leq m \leq \frac{1}{2} \cdot n \cdot (n-1) \cdot (k+1)$
- $1 \leq x, y \leq n$, $x \neq y$, and $1 \leq z \leq k$

- No two opinions are the same.

Subtasks

1. (9 points) $k = 2$
2. (21 points) All opinions are of type 2.
3. (22 points) $1 \leq n \leq 13$
4. (48 points) No further constraints.

Examples

Example 1

```
4 2 3
2 1 2 1
1 2 3
2 3 4 1
```

The correct output is

```
2
```

If, in an assignment, the student i is assigned to bus b_i, we denote that assignment by the sequence $(b_1, b_2, \ldots, b_n)$. Then two possible assignments for each students are:

- $(1, 1, 2, 2)$
- $(2, 2, 1, 1)$

The following are examples of invalid assignment:

- $(1, 1, 1, 1)$ because student 2 and 3 are in the same bus.
- $(1, 1, 2, 1)$ becuase student 4 is in bus 1 but student 3 is not in bus 1, violating the opinion 3.

Example 2

```
3 2 4
1 1 2
2 1 3 1
2 1 3 2
2 3 2 2
```

The correct output is:

```
0
```

There is no suitable assignment that satisfies all the opinions.

Example 3

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

The correct output is:

```
7
```