Problem J. Japanese Bands

Grammy is designing a new trading card game (TCG) based on her favorite Japanese music media franchise, *BanG Dream!*. By her design, there are n_1 character cards and n_2 music cards in total. Now she needs to assign an integer between 1 and m (both inclusive) for each card, representing the magic power it contains.

In every TCG game, there must be some certain combos that may cause extra damage. Grammy now is considering a special rule that relates to the value assigned to cards. Specifically, k pairs of integers $(a_1, b_1), (a_2, b_2), \cdots, (a_k, b_k)$ are chosen, satisfying $1 \le a_i, b_i \le m$. Grammy wants to make sure each of these value combos can be played in her game. Therefore, for each pair of integers (a_i, b_i), the assignment must meet at least one of the two following constraints:

- a_i can be found on a character card and b_i can be found on a music card.
- a_i can be found on a music card and b_i can be found on a character card.

Please help Grammy count the number of valid card-value assignments.

Let $\mathbb{C}$ be the multi-set of the integers on the character card and $\mathbb{M}$ be the multi-set of the integers on the music card. We say two assignments are different if their $\mathbb{C}$s are different or their $\mathbb{M}$s are different.

Recall that an integer can appear multiple times in a multi-set. We say two multi-sets $\mathbb{X}$ and $\mathbb{Y}$ are different if there exists an integer k such that the number of times k appears in $\mathbb{X}$ is not equal to that in $\mathbb{Y}$.

Input

There are multiple test cases. The first line of the input contains an integer T ($1 \le T \le 500$) indicating the number of test cases. For each test case:

The first line contains four integers n_1, n_2, m and k ($1 \le n_1, n_2 \le 10^9$, $1 \le m \le 20$, $1 \le k \le m^2$).

For the following k lines, the i-th line contains two integers a_i and b_i ($1 \le a_i, b_i \le m$).

It's guaranteed that there are at most 5 test cases satisfying $m > 10$.

Output

For each test case output one line containing one integer indicating the number of valid card-value assignments. As the answer may be large, output the answer modulo $(10^9 + 7)$.

Example

standard input	standard output
3 2 3 3 3 2 3 1 1 2 3 2 2 2 1 1 1 1 1 10 2 1 2 1 3	6 4 0

Note

For the first sample test case, the valid pairs of $(\mathbb{C}, \mathbb{M})$ are $(\{1,2\},\{1,1,3\})$, $(\{1,2\},\{1,2,3\})$, $(\{1,2\},\{1,3,3\})$, $(\{1,3\},\{1,1,2\})$, $(\{1,3\},\{1,2,2\})$ and $(\{1,3\},\{1,2,3\})$.

For the second sample test case, the valid pairs of $(\mathbb{C}, \mathbb{M})$ are $(\{1,1\},\{1,1\})$, $(\{1,2\},\{1,1\})$, $(\{1,1\},\{1,2\})$ and $(\{1,2\},\{1,2\})$.