Japanese Bands

Input file: standard input
Output file: standard output

Time limit: 3 seconds

Memory limit: 1024 megabytes

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 $(a_1, b_1), (a_2, b_2), \dots, (a_k, b_k)$ 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.

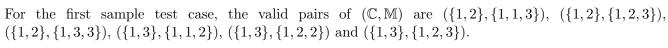
Output

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	6
2 3 3 3	4
2 3	0
1 1	
2 3	
2 2 2 1	
1 1	
1 1 10 2	
1 2	
1 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 $(\{1, 2\}, \{1, 2\})$.