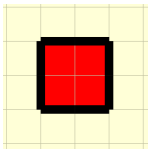
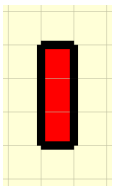
3xN Tiling (INOI2002)

There is a floor with dimensions $K \times N$, where K is 1, 2, or 3. You have infinite tiles of two types:

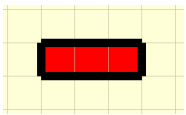
- Type 1: 2×2 square tiles



- Type 2: 3×1 tiles.



These tiles can be rotated and be used as 1×3 tiles as well.



You need to use these tiles to cover the entire floor, in such a way that every cell of the floor is covered by exactly one tile and all the tiles lie completely within the floor. You have to find the number of different ways to doing so. Since the answer might be large, output it modulo $10^9 + 7$.

Input Format

- The first line contains a single integer, T, denoting the number of testcases.
- Each testcase consists of a single line containing two integers, K and N.

Output Format

- For each testcase, output a single line containing a single integer, which is the number of different tilings possible, modulo $10^9 + 7$.

Constraints

- $1 \leq T \leq 10$
- $1 \leq K \leq 3$
- $1 \leq N \leq 10^6$

Subtasks

- **Subtask 1** (15% points) : $K = 1$
- **Subtask 2** (17% points) : $K = 2$
- **Subtask 3** (68% points) : $K = 3$

Sample Input

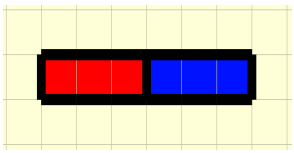
```
4
1 5
1 6
2 6
3 6
```

Sample Output

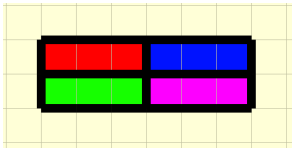
```
0
1
2
8
```

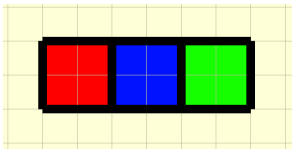
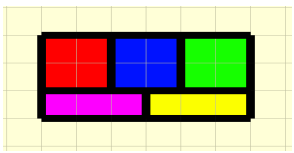
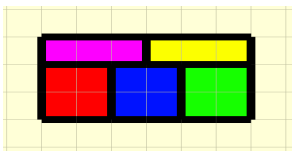
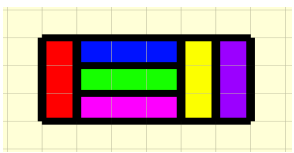
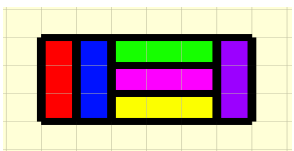
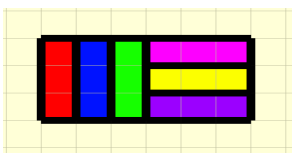
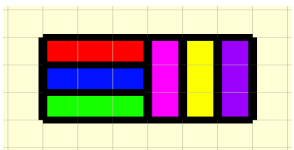
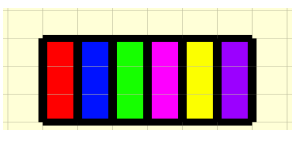
Explanation

- There is no way to tile a 1×5 floor with the given tiles. Hence the answer is 0.
- There is only one way to tile a 1×6 floor.



- There are two ways to tile a 2×6 floor.





- There are eight ways to tile a 3×6 floor.