# Project Euler #213: Flea Circus

This problem is a programming version of Problem 213 from projecteuler.net

An $n \times n$ grid of squares contains $n^2$ fleas, initially one flea per square.

When a bell is rung, each flea jumps to an adjacent square at random (usually $4$ possibilities, except for fleas on the edge of the grid or at the corners).

What is the expected number of unoccupied squares after $m$ rings of the bell? As this number is rational, it could be represented as $\frac{P}{Q}$. Give your answer as $P \times Q^{-1} \bmod 10^9 + 7$. It's guaranteed that $Q$ is coprime to $10^9 + 7$.

**Input Format**

The first line of each test file contains a single integer $q$, which is the number of queries per test file. $q$ lines follow with integers $n$ and $m$ on each, separated by a single space.

**Constraints**

- $1 \leq q \leq 100$
- $1 \leq n \leq 40$
- $n$ is even
- $1 \leq m \leq 200$
- Sum of all $m$ in each test file $\leq 200$

**Output Format**

Print exactly $q$ lines with an answer for the corresponding query on each.

**Sample Input 0**

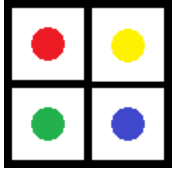
```
1
2 1
```

**Sample Output 0**

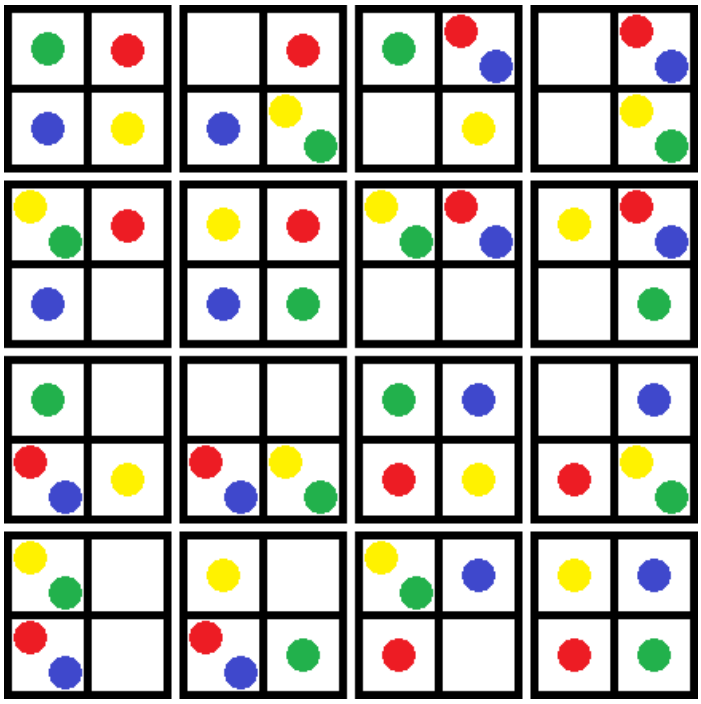
```
1
```

**Explanation 0**

At the beginning, the field looks as follows:



After the only bell ring there could be $16$ variants:



So we have $4$ variants with $0$ free cells, $8$ variants with $1$ free cell and $4$ variants with $2$ free cells. That means, the expected number of empty cells is equal to $\frac{4}{16} \times 0 + \frac{8}{16} \times 1 + \frac{4}{16} \times 2 = 1$.