Project Euler #148: Exploring Pascal's triangle.

This problem is a programming version of Problem 148 from projecteuler.net

We can easily verify that none of the entries in the first seven rows of Pascal's triangle are divisible by 7:

$$
\begin{array}{ccccccccccccc}
 & & & & & & 1 & & & & & & \\
 & & & & & 1 & & 1 & & & & & \\
 & & & & 1 & & 2 & & 1 & & & & \\
 & & & 1 & & 3 & & 3 & & 1 & & & \\
 & & 1 & & 4 & & 6 & & 4 & & 1 & & \\
 & 1 & & 5 & & 10 & & 10 & & 5 & & 1 & \\
1 & & 6 & & 15 & & 20 & & 15 & & 6 & & 1
\end{array}
$$

However, if we check the first one hundred rows, we will find that only 2361 of the 5050 entries are *not* divisible by 7.

Find the number of entries which are *not* divisible by 7 in the first N rows and first R columns of Pascal's triangle. Here, "column" means a column when the triangle is written this way:

$$
\begin{array}{cccccccc}
1 & & & & & & & \\
1 & 1 & & & & & & \\
1 & 2 & 1 & & & & & \\
1 & 3 & 3 & 1 & & & & \\
1 & 4 & 6 & 4 & 1 & & & \\
1 & 5 & 10 & 10 & 5 & 1 & & \\
1 & 6 & 15 & 20 & 15 & 6 & 1 & \\
\vdots & & & & & & &
\end{array}
$$

Since the answer can be very large, output it modulo $10^9 + 7$.

Input Format

The first line of input contains T, the number of test cases.

Each test case consists of one line containing two integers, N and R, separated by a space.

Constraints

$1 \leq T \leq 3 \times 10^4$
$0 \leq R \leq N \leq 10^{18}$

Test files #01-#03: $N \leq 5000$
Test files #04-#06: $R = N$
Test files #07-#09: $R \leq 5000$
Test files #10-#12: $N - R \leq 5000$
Test files #13-#15: No additional constraints.

Output Format

For each test case, output a single line containing a single integer, the answer for that test case.

Sample Input

```
3
5 3
100 100
100 50
```

Sample Output

```
12
2361
1622
```

Explanation

In the first test case, the following are the entries in the first 5 rows and first 3 columns: (highlighted in bold)

$$\begin{array}{cccccccc} \mathbf{1} & & & & & & \\ \mathbf{1} & \mathbf{1} & & & & & \\ \mathbf{1} & \mathbf{2} & \mathbf{1} & & & & \\ \mathbf{1} & \mathbf{3} & \mathbf{3} & 1 & & & \\ \mathbf{1} & \mathbf{4} & \mathbf{6} & 4 & 1 & & \\ 1 & 5 & 10 & 10 & 5 & 1 & \\ 1 & 6 & 15 & 20 & 15 & 6 & 1 \\ \vdots & & & & & & \end{array}$$

There are 12 entries all in all, and they are all not divisible by 7. Thus, the answer is 12.

The second test case is mentioned in the problem statement.