Project Euler #203: Squarefree Binomial Coefficients

This problem is a programming version of Problem 203 from projecteuler.net

The binomial coefficients ${}^nC_k$ can be arranged in triangular form, Pascal's triangle, like this:

$$
\begin{array}{ccccccccccccccc}
 & & & & & & & 1 & & & & & & & \\
 & & & & & & 1 & & 1 & & & & & & \\
 & & & & & 1 & & 2 & & 1 & & & & & \\
 & & & & 1 & & 3 & & 3 & & 1 & & & & \\
 & & & 1 & & 4 & & 6 & & 4 & & 1 & & & \\
 & & 1 & & 5 & & 10 & & 10 & & 5 & & 1 & & \\
 & 1 & & 6 & & 15 & & 20 & & 15 & & 6 & & 1 & \\
1 & & 7 & & 21 & & 35 & & 35 & & 21 & & 7 & & 1
\end{array}
$$

....

It can be seen that the first eight rows of Pascal's triangle contain twelve distinct numbers:

$1, 2, 3, 4, 5, 6, 7, 10, 15, 20, 21$ and 35.

A positive integer n is called squarefree if no square of a prime divides n. Of the twelve distinct numbers in the first eight rows of Pascal's triangle, all except 4 and 20 are squarefree. The sum of the distinct squarefree numbers in the first eight rows is 105.

Find the sum of the distinct squarefree numbers in the first K rows of Pascal's triangle.

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

Input Format

First line of each test file contains a single integer Q which is the number of queries per this file. Q lines follow each containing a single integer K_i that is the number of the rows in the Pascal's triangle.

Constraints

- $1 \leq Q \leq 150$
- $1 \leq K_i \leq 15 \times 10^4$

Output Format

Output exactly Q lines with the answer modulo $10^9 + 7$ for the i-th query on i-th line.

Sample Input 0

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8
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Sample Output 0

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105
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Explanation 0

$(1 + 2 + 3 + 5 + 6 + 7 + 10 + 15 + 21 + 35) \text{ mod } (10^9 + 7) = 105$