Bits. Exponents and Gcd

Rastas's has been given a number n. Being weak at mathematics, she has to consider all the numbers from 1 to $2^n - 1$ so as to become perfect in calculations. (You can assume each number is consider as a soldier).

We define the strength of number i as the number of set bits (bits equal to 1) in binary representation of number i.

If the greatest common divisor of numbers a and b is $gcd(a, b)$,

Rastas would like to calculate the function S which is equal to:

As the friend of Rastas, it's your duty to calculate S modulo $10^9 + 7$.

Input

The first line of the input contains the number of test cases, **T**. Each of the next **T** lines contains an integer **n**, as mentioned in the question

Output

For each value of **n** given, find the value of the function **S**.

Constraints

Sum of **n** over all test cases doesn't exceed **2500**.

Example

Input:

3

1

2

5

Output:

0

3

680