Problem F. Function Counting

Input file:	*standard input*
Output file:	*standard output*
Time limit:	1 second
Memory limit:	512 mebibytes

Let M be the set of integers at most n by absolute value, that is, $M = \{x \in \mathbb{Z} \colon |x| \le n\}$.

Let $f_k(x)$ be the function f applied k times to an initial value x, that is, $f_0(x) = x$ and $f_i(x) = f(f_{i-1}(x))$ for any $i \ge 1$.

Given the integers n and k, count the number of functions $f(x)$ satisfying the following conditions:

1. $f \colon M \to M$,
2. $\forall x \in M \colon f_k(x) = -x$,
3. $\forall x \in M \colon |(|f(x)| - |x|)| \le 2$.

As the answer may be very large, print it modulo $10^9 + 7$.

Input

The first line of input contains an integer T, the number of test cases ($1 \le T \le 100$).

Each test case contains a pair of positive integers n and k ($n \cdot k \le 10^9$).

The total sum of $n \cdot k$ over all test cases does not exceed $4 \cdot 10^9$.

Output

For each test case, output the answer modulo $10^9 + 7$ on a separate line.

Example

standard input	standard output
7 1 1 2 1 100 1 1 2 2 2 3 2 20 4	1 1 1 0 2 0 1048576

Note

If $k = 1$, only the function $f(x) = -x$ satisfies all requirements.

If $n = k = 2$, two functions exist:
$(-2, -1, 0, 1, 2) \to (1, -2, 0, 2, -1)$ and
$(-2, -1, 0, 1, 2) \to (-1, 2, 0, -2, 1)$.