

Problem J. Talk That Talk

Input file: standard input
Output file: standard output
Time limit: 2 seconds
Memory limit: 512 megabytes

Gauri is a big fan of the K-pop group TWICE. Recently, TWICE has released a song called “Talk That Talk”, and since then Gauri has been mesmerized by evenly-spaced triplets.

Given an integer t binary string s , where its indices are labelled from 1 to $|s|$, we define its t -value as the number of TTT-triplets. A triplet (i, j, k) is a TTT-triplet if and only if following conditions are met:

1. $1 \leq i < j < k \leq |s|$
2. $j - i = k - j$, and $1 \leq j - i \leq t$
3. $s_i = s_j = s_k$

Today Gauri received an integer t and a string w of length $p - 1$ as a present, where p is a prime. She noticed that for all $1 \leq x \leq p - 1$, $w_x = 1$ if there exists an integer z such that $z^2 \equiv x \pmod{p}$, and 0 otherwise. Help Gauri compute the t -value of w .

Each test consist of multiple testcases. There are T test cases.

Input

The first line consists of an integer T , the number of testcases.

The next T lines consists of 2 integers p and t .

Constraints

- $5 \leq p \leq 10^{12}$, and p is a prime number.
- $1 \leq t \leq 10^6$
- $1 \leq T \leq 5 \cdot 10^5$
- Sum of t among all tests is at most 10^6 .

Output

Output T lines, one for each test case denoting the t -value of w .

Example

standard input	standard output
7	0
7 32	2
13 1	2
13 2	146
67 11	21510
2003 44	495014784
1000003 1984	246913256130162788
999999999989 987654	

Note

When $p = 13$, we get $w = 101100001101$, possible TTT-triplets are $(5, 6, 7)$, $(6, 7, 8)$, $(2, 5, 8)$, and $(5, 8, 11)$. Now if $t = 2$, the latter two triplets have $j - i > t$, violating condition 2. Thus, the answer for $p = 13$, $t = 2$ is 2.