

Problem G

Modular Multiplicative Inverse

Time limit: 1 second

Memory limit: 256 megabytes

Problem Description

We say a is the modular multiplicative inverse of a positive integer n with respect to m if $an \equiv 1(\text{mod } m)$, i.e., $an = 1 + qm$ for some integer q . Given n, m , compute a .

Input Format

The first line of the input contains an integer T ($T \leq 500$) indicating the number of test cases. Each test case is a line containing two integers n and m where $1 \leq n < m \leq 1048576000$.

Output Format

For each case, output the minimum positive integer a such that $an \equiv 1(\text{mod } m)$. If there does not exist such integer, output -1 .

Sample Input

```
3
1 2
2 4
3 5
```

Sample Output

```
1
-1
2
```