Project Euler #243: Resilience

This problem is a programming version of Problem 243 from projecteuler.net

A positive fraction whose numerator is less than its denominator is called a proper fraction. For any denominator d, there will be $d-1$ proper fractions.

We shall call a fraction that cannot be cancelled down a resilient fraction. Furthermore we shall define the resilience of a denominator $R(d)$ to be the ratio of its proper fractions that are resilient.

For example, for $d = 12$: $1/12, 5/12, 7/12, 11/12$ are the resilient fractions.

Therefore, $R(12) = 4/11$

In fact, $d = 12$ is the smallest denominator having a resilience $R(d) < 4/10$

Given pairs of integers a_i, b_i, representing numerator and denominator of a proper fraction q_i, find the smallest denominator d, having resilience $R(d) < q_i$

Input Format

The first line of each test file contains a single integer T. Next T lines each contain a pair of integers a_i, b_i, separated by a single space, representing q_i.

Constraints

- $1 \leq T \leq 50000$
- $1 \leq a_i < b_i \leq 100000$
- $q_i \geq 1/10$

Output Format

For each q_i print the answer on a separate line.

Sample Input 0

```
1
4 10
```

Sample Output 0

```
12
```

Explanation 0

See problem description