

Product of factorials (hard)

For n positive integer, let $F(n) = 1! \times 2! \times 3! \times 4! \times \dots \times n!$, product of factorial(i) for i in $[1..n]$,

For p a prime number, and n an integer, and let $V(p, n) = \max(\{i \geq 0 \text{ integer, such that } p^i \text{ divides } F(n)\})$.

Input

The first line of input contains an integer T , the number of test cases.

On each of the next T lines, you are given two integers p a prime number, and e .

Output

For each test case, you have to print $V(p, p^e)$.

As the answer may not fit in a 64-bit container, just output your answer modulo 10^9+7 .

Example

Input:

```
1
2 2
```

Output:

```
5
```

Constraints

$0 < T < 10^5$

$1 < p < 10^{18}$, a prime number

$0 < e < 10^{18}$

p and e are log-uniform independent randomly distributed. **Warning** : input contains tricky cases too.

A single line of human-readable-Python code can get AC in the third of the time limit. A fast C code ends in 0.04s. (edit 2017-02-11, after compiler changes)

;-) Have fun.