
Fraction Reduction

Input file: **standard input**
Output file: **standard output**
Time limit: 1 second
Memory limit: 256 megabytes

Chiaki has a fraction $\frac{a}{b}$ (not necessary an irreducible fraction) and can perform the following 2 operations:

- If the current fraction is x , Chiaki can change it to $-\frac{1}{x}$.
- If the current fraction is x , Chiaki can change it to $x + 1$.

Now, Chiaki would like to know the number of minimum operations needed to make $\frac{a}{b}$ become 0. Since this number may be very large, you are only asked to calculate it modulo $10^9 + 7$.

Input

There are multiple test cases. The first line of the input contains an integer T ($1 \leq T \leq 10^5$), indicating the number of test cases. For each test case:

The first line contains two integers a and b ($-10^{18} \leq a \leq 10^{18}, 1 \leq b \leq 10^{18}$), denoting the fraction.

Output

For each test case, output an integer denoting the the number of minimum operations modulo $10^9 + 7$, or -1 if there's no such operations to make $\frac{a}{b}$ become 0.

Example

standard input	standard output
5	0
0 1	2
1 1	4
-1 2	4
-2 4	10
8 5	

Note

For the 1-st sample, you don't need any operations.

For the 2-nd sample, one possible sequence is: $\frac{1}{1} \rightarrow -\frac{1}{1} \rightarrow 0$.

For the 3-rd sample, one possible sequence is: $-\frac{1}{2} \rightarrow \frac{1}{2} \rightarrow -\frac{2}{1} \rightarrow -\frac{1}{1} \rightarrow 0$.

For the 4-th sample, one possible sequence is: $-\frac{2}{4} \rightarrow \frac{2}{4} \rightarrow -\frac{4}{2} \rightarrow -\frac{2}{2} \rightarrow 0$.

For the 5-th sample, one possible sequence is: $\frac{8}{5} \rightarrow -\frac{5}{8} \rightarrow \frac{3}{8} \rightarrow -\frac{8}{3} \rightarrow -\frac{5}{3} \rightarrow -\frac{2}{3} \rightarrow \frac{1}{3} \rightarrow -\frac{3}{1} \rightarrow -\frac{2}{1} \rightarrow -\frac{1}{1} \rightarrow 0$.