Problem I. The Answer!

Input file: `standard input`
Output file: `standard output`

Millions of years ago, a very smart hyperspace race built a supercomputer, DeepThought. They gave DeepThought two positive integers x and y, and let her calculate **The Answer** to Life, the Universe and Everything.

DeepThought didn't know how to calculate **The Answer** and she was in a hurry to watch TV, so she made a big integer using very complicated steps and no one would know how she got the result:

- Firstly, DeepThought chose an integer a greater than 1.
- Secondly, she calculated $\left(a^{F_x}-1\right)$ and $\left(a^{F_y}-1\right)$, denoted by u and v respectively, where F_n is the n-th term of the Fibonacci sequence, given by the recursion: $F_1=1$, $F_2=1$ and $F_n=F_{n-1}+F_{n-2}$ for integer $n\geq 3$.
- Lastly, she computed the ratio of these two numbers' least common multiple $\mathrm{lcm}(u,v)$ to their greatest common divisor $\gcd(u,v)$ as **The Answer**, which is obviously an integer.

Since she has gone for leisure activities, the task to calculate **The Answer** is left to you. For the secrecy of **The Answer**, you are only asked to report **The Answer** modulo m.

Input

The first line contains an integer T ($1\leq T\leq 10^4$), indicating the number of test cases.

Then follow T test cases. For each test case:

The only line contains four integers x, y, a and m ($1\leq x,y\leq 10^9, 2\leq a,m\leq 10^9$).

Output

For each test case, output an integer in one line, representing **The Answer** modulo m.

Example

standard input	standard output
3 3 3 3 97 7 3 2 1901 6 12 3 100	1 1761 98

Note

For the first example case, $F_x=F_y=2$, $u=v=a^2-1=8$, $\mathrm{lcm}(u,v)=\gcd(u,v)=8$, so **The Answer** is $8/8=1$, and you need to report $1 \bmod 97=1$.

For the second example case, $F_x=13$, $F_y=2$, $u=a^{13}-1=8191$, $v=a^2-1=3$, $\mathrm{lcm}(u,v)=24573$, $\gcd(u,v)=1$, so **The Answer** is $24573/1=24573$, and you need to report $24573 \bmod 1901=1761$.