“It’s you, Captain Obvious!” — cried the evil Rabbit-Man — “you came here to foil my evil plans!”

“Yes, it’s me.” — said Captain Obvious.

“But... how did you know that I would be here, on 625 Sunflower Street?! Did you crack my evil code?”

“I did. Three days ago, you robbed a bank on 5 Sunflower Street, the next day you blew up 25 Sunflower Street, and yesterday you left quite a mess under number 125. These are all powers of 5. And last year you pulled a similar stunt with powers of 13. You seem to have a knack for Fibonacci numbers, Rabbit-Man.”

“That’s not over! I will learn... arithmetics!” — Rabbit-Man screamed as he was dragged into custody — “You will never know what to expect... Owww! Not my ears, you morons!”

“Maybe, but right now you are being arrested.” — Captain added proudly.

Unfortunately, Rabbit-Man has now indeed learned some more advanced arithmetics. To understand it, let us define the sequence $F_n$ (being not completely unlike the Fibonacci sequence):

$$
F_1 = 1,
F_2 = 2,
F_n = F_{n-1} + F_{n-2} \quad \text{for } n \geq 3.
$$

Rabbit-Man has combined all his previous evil ideas into one master plan. On the $i$-th day, he does a malicious act on the spot number $p(i)$, defined as follows:

$$p(i) = a_1 \cdot F_{i1} + a_2 \cdot F_{i2} + \ldots + a_k \cdot F_{ik}.$$

The number $k$ and the integer coefficients $a_1, \ldots, a_k$ are fixed. Captain Obvious learned $k$, but does not know the coefficients. Given $p(1), p(2), \ldots, p(k)$, help him to determine $p(k + 1)$. To avoid overwhelmingly large numbers, do all the calculations modulo a fixed prime number $M$. You may assume that $F_1, F_2, \ldots, F_n$ are pairwise distinct modulo $M$. You may also assume that there always exists a unique solution for the given input.

**Input**

The first line of input contains the number of test cases $T$. The descriptions of the test cases follow:

The first line of each test case contains two integers $k$ and $M$, $1 \leq k \leq 4000$, $3 \leq M \leq 10^9$. The second line contains $k$ space-separated integers — the values of $p(1), p(2), \ldots, p(k)$ modulo $M$.

**Output**

Print the answers to the test cases in the order in which they appear in the input. For each test case print a single line containing one integer: the value of $p(k + 1)$ modulo $M$.

**Explanation:** the first sequence is simply $5^i \mod 619$, therefore the next element is $5^5 \mod 619 = 30$. The second sequence is $2 \cdot 1^i + 3^i \mod 101$.

**Sample Input**

```
2
4 619
5 25 125 6
3 101
5 11 29
```

**Sample Output**

```
30
83
```