Find Linear Recurrence

You are given the first $2K$ integers $a_0, a_1, \ldots, a_{2K-1}$ (modulo M) of an infinite sequence $(a_i)_{i=0}^{\infty}$ that satisfies an integer-coefficient linear recurrence relation of order K.

That is, they satisfy $$ a_n = \sum_{i=1}^{K} c_i a_{n-i} $$ for $n \ge K$, where $c_1, \ldots, c_K$ are integer constants.

Find a_{2K} modulo M.

Input

The first line contains T ($1 \le T \le 4000$), the number of test cases.

Each test case consists of two lines:

- First line contains K ($1 \le K \le 50$) and M ($1 \le M < 2^{31}$).
- Next line contains $2K$ integers $a_0, a_1, \ldots, a_{2K-1}$ (modulo M).

Note: M is **not necessarily a prime**.

Output

For each test case, output a_{2K} modulo M.

Example

Input

```
6
1 16
4 8
1 10
4 8
2 64
13 21 34 55
2 27
13 21 7 1
3 1000000007
32 16 8 4 2 1
2 64
13 21 34 56
```

Output

```
0
6
25
8
500000004
40
```