SuperPower

You are given two arrays a and b of size n. You are also given a number p.

You are supposed to find (a[0]^b[0] + a[1]^b[1] + ... a[n-1]^b[n-1]) % p

You must also know that

(a + b) % c = (a%c + b%c) % c

and

(a * b) % c = (a%c * b%c) % c

Warning: The actual value a[i]^b[i] may not fit in any primitive data-type, infact it may not even fit in the RAM.

Input

First line contains T (T <= 12) which is the number of test-cases.

Then contain T-blocks having the following format.

First line of each block contains a number n which is the number of elements of arrays a and b and the number p.

Second line of each block contains n-integers which are the values a[0], a[1] ... a[n-1]

Third line of each block contains n-integers which are the values b[0], b[1] ... b[n-1]

Output

For each block of input print the answer.

Example

Input:
```
2
3 5
2 3 4
1 1 1
4 4
2 2 2 2
1 1 1 1
```

Output:
```
4
0
```