



Residual Polynomial

Time Limit: 6000/3000 MS (Java/Others) Memory Limit: 524288/524288 K (Java/Others)
 Total Submission(s): 0 Accepted Submission(s): 0

Problem Description

Kanade has n polynomials $f_1(x) \dots f_n(x)$. These polynomials satisfy the following conditions:

1. $f_1(x) = \sum_{i=0}^n a_i x^i$
2. $\forall i \in [2, n], f_i(x) = b_i(f_{i-1}(x))' + c_i f_{i-1}(x)$

Given $a_0, a_1, \dots, a_n, b_2, b_3, \dots, b_n, c_2, c_3, \dots, c_n$, Kanade wants to know $f_n(x)$

Because the coefficients of $f_n(x)$ may be very large, you only need to output them module 998244353

Input

There are T test cases.

The first line has 1 integer T .

Then for every test case:

The first line has 1 integer n .

The second line has $n + 1$ integers $a_{0\dots n}$

The third line has $n - 1$ integers $b_{2\dots n}$

The fourth line has $n - 1$ integers $c_{2\dots n}$

$1 \leq T \leq 100$

$3 \leq n \leq 10^5$

$0 \leq a_i, b_i, c_i < 998244353$

There are at most 3 test cases satisfy that $n > 1000$

Output

For every test case, if $f_n(x) = \sum_{i=0}^n w_i x^i$, then output $n + 1$ integers $w_{0\dots n}$ in a line and separate them by spaces.

Sample Input

```
3
3
0 0 0 1
1 1
1 1
4
1 1 1 1 1
1 2 1
2 3 2
5
3 4 5 6 5 4
4 1 6 0
6 9 2 7
```

Sample Output

```
0 6 6 1
66 166 204 92 12
37940 117264 204708 207256 60900 3024
```

