

The problem statement has recently been changed. [View the changes.](#)

## B. Gellyfish and Baby's Breath

time limit per test: 1 second

memory limit per test: 256 megabytes

Flower gives Gellyfish two permutations\* of  $[0, 1, \dots, n-1]$ :  $p_0, p_1, \dots, p_{n-1}$  and  $q_0, q_1, \dots, q_{n-1}$ .

Now Gellyfish wants to calculate an array  $r_0, r_1, \dots, r_{n-1}$  through the following method:

- For all  $i$  ( $0 \leq i \leq n-1$ ),  $r_i = \max_{j=0}^i (2^{p_j} + 2^{q_{i-j}})$

But since Gellyfish is very lazy, you have to help her figure out the elements of  $r$ .

Since the elements of  $r$  are very large, you are only required to output the elements of  $r$  modulo 998 244 353.

\*An array  $b$  is a permutation of an array  $a$  if  $b$  consists of the elements of  $a$  in arbitrary order. For example,  $[4, 2, 3, 4]$  is a permutation of  $[3, 2, 4, 4]$  while  $[1, 2, 2]$  is not a permutation of  $[1, 2, 3]$ .

### Input

Each test contains multiple test cases. The first line contains the number of test cases  $t$  ( $1 \leq t \leq 10^4$ ). The description of the test cases follows.

The first line of each test case contains a single integer  $n$  ( $1 \leq n \leq 10^5$ ).

The second line of each test case contains  $n$  integers  $p_0, p_1, \dots, p_{n-1}$  ( $0 \leq p_i < n$ ).

The third line of each test case contains  $n$  integers  $q_0, q_1, \dots, q_{n-1}$  ( $0 \leq q_i < n$ ).

It is guaranteed that both  $p$  and  $q$  are permutations of  $[0, 1, \dots, n-1]$ .

It is guaranteed that the sum of  $n$  over all test cases does not exceed  $10^5$ .

### Output

For each test case, output  $n$  integers  $r_0, r_1, \dots, r_{n-1}$  in a single line, modulo 998 244 353.

### Example

input	Copy
3 3 0 2 1 1 2 0 5 0 1 2 3 4 4 3 2 1 0 10 5 8 9 3 4 0 2 7 1 6 9 5 1 4 0 3 2 8 7 6	
output	Copy
3 6 8 17 18 20 24 32 544 768 1024 544 528 528 516 640 516 768	

### Note

In the first test case:

- $r_0 = 2^{p_0} + 2^{q_0} = 1 + 2 = 3$
- $r_1 = \max(2^{p_0} + 2^{q_1}, 2^{p_1} + 2^{q_0}) = \max(1 + 4, 4 + 2) = 6$
- $r_2 = \max(2^{p_0} + 2^{q_2}, 2^{p_1} + 2^{q_1}, 2^{p_2} + 2^{q_0}) = (1 + 1, 4 + 4, 2 + 2) = 8$

### Codeforces Round 1028 (Div. 2)

Contest is running

00:48:23

Contestant



### → Submit?

Language: GNU G++23 14.2 (64 bit, ms) ▼

Choose file:  No file chosen

Be careful: there is 50 points penalty for submission which fails the pretests or resubmission (except failure on the first test, denial of judgement or similar verdicts). "Passed pretests" submission verdict doesn't guarantee that the solution is absolutely correct and it will pass system tests.

### → Last submissions

Submission	Time	Verdict
<a href="#">322261090</a>	May/31/2025 18:45	Pretests passed

### → Score table

	Score
<a href="#">Problem A</a>	358
<a href="#">Problem B</a>	537
<a href="#">Problem C</a>	895
<a href="#">Problem D</a>	1432
<a href="#">Problem E</a>	1790
<a href="#">Problem F</a>	2148
Successful hack	100
Unsuccessful hack	-50
Unsuccessful submission	-50
Resubmission	-50

\* If you solve problem on 01:11 from the first attempt

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