F. Faculty

time limit per test: 2 seconds
memory limit per test: 256 megabytes

In 2077, after the world was enslaved by robots, the robots decided to implement an educational reform, and now the operation of taking the modulus is only taught in the faculty of "Ancient World History". Here is one of the entrance tasks for this faculty:

We define the `beauty` of an array of positive integers b as the maximum $f(b_i, b_j)$ over all pairs $1 \le i, j \le n$, where $f(x, y) = (x \bmod y) + (y \bmod x)$.

Given an array of positive integers a of length n, output n numbers, where the i-th number ($1 \le i \le n$) is the `beauty` of the array $a_1, a_2, \ldots, a_i$.

$x \bmod y$ is the remainder of the division of x by y.

Input

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

The first line of each test case contains a single integer n ($1 \le n \le 10^6$) — the size of the array a.

The second line of each test case contains n integers $a_1, a_2, \ldots, a_n$ ($1 \le a_i \le 10^9$).

It is guaranteed that the sum of n across all test cases does not exceed 10^6.

Output

For each test case, output n integers — the beauties of all prefixes of the array a.

Example

input Copy

```
2
5
3 1 4 1 5
7
5 11 11 4 2 1 10
```

output Copy

```
0 1 4 4 5
0 6 6 7 7 7 11
```

Note

The beauty of the array 3 is 0.

The beauty of the array $3, 1$ is $f(3, 1) = 1$.

The beauty of the array $3, 1, 4$ is $f(3, 4) = 4$.

The beauty of the array $3, 1, 4, 1$ is $f(4, 3) = 4$.

The beauty of the array $3, 1, 4, 1, 5$ is $f(4, 5) = 5$.

Codeforces Round 1026 (Div. 2)
Finished
Practice

→ Virtual participation

Virtual contest is a way to take part in past contest, as close as possible to participation on time. It is supported only ICPC mode for virtual contests. If you've seen these problems, a virtual contest is not for you - solve these problems in the archive. If you just want to solve some problem from a contest, a virtual contest is not for you - solve this problem in the archive. Never use someone else's code, read the tutorials or communicate with other person during a virtual contest.

Start virtual contest

→ Clone Contest to Mashup

You can clone this contest to a mashup.

Clone Contest

→ Submit?

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

Choose file: Choose File No file chosen

Submit

→ Last submissions

Submission	Time	Verdict
322399711	Jun/01/2025 16:21	Accepted
322399558	Jun/01/2025 16:20	Time limit exceeded on test 17
321124473	May/24/2025 19:00	Time limit exceeded on pretest 17

→ Problem tags

brute force greedy math number theory *2400

No tag edit access

→ Contest materials

- Announcement
- Tutorial

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