

Problem C. Circles

Input file: *standard input*
 Output file: *standard output*
 Time limit: 1 second
 Memory limit: 512 mebibytes

Given an array of non-negative integers $s_1, \dots, s_n$ with $n \geq 3$, let's call a sequence of n non-negative numbers (not necessarily integers) $x_1, x_2, \dots, x_n$ *balanced* if for each i , the constraint $x_i + x_{i+1} \leq s_i$ is satisfied, where $x_{n+1} = x_1$.

Let's denote $f(s_1, s_2, \dots, s_n)$ as the largest $x_1 + x_2 + \dots + x_n$ among all balanced configurations of weights.

You are given an array of non-negative integers $a_1, a_2, \dots, a_n$.

Find $n - 2$ numbers: $f(a_1, a_2, a_3), f(a_1, a_2, a_3, a_4), \dots, f(a_1, a_2, a_3, \dots, a_n)$.

Input

The first line contains one integer n ($3 \leq n \leq 100\,000$).

The second line contains n integers $a_1, a_2, \dots, a_n$ ($0 \leq a_i \leq 100\,000$).

Output

Print $n - 2$ numbers: $f(a_1, a_2, a_3), f(a_1, a_2, a_3, a_4), \dots, f(a_1, a_2, a_3, \dots, a_n)$.

Your answer will be considered correct if the relative or absolute error of all values in it is at most 10^{-9} .

Examples

standard input	standard output
4 20 20 20 15	30.0 35
6 1 2 1 2 1 2	2 2 3 3
12 1 1 1 3 1 1 2 5 3 2 1 2	1.5 2 3 3 4 5 8 8 9 9

Note

In the first example, for the prefix with three elements we can set values $\{10, 10, 10\}$, for the next prefix we can set values $\{10.1, 9.9, 10.1, 4.9\}$.