Divide the Sequence

Input file:	`standard input`
Output file:	`standard output`
Time limit:	3 seconds
Memory limit:	1024 megabytes

Given an integer sequence $a_1, a_2, \cdots, a_n$ of length n, divide the sequence into k continuous non-empty subarrays such that each element belongs to exactly one subarray. Let s_i be the sum of elements in the i-th subarray from left to right, for each $1 \le k \le n$, calculate the maximum value of

$$\sum_{i=1}^{k} i \times s_i$$

More formally, for each $1 \le k \le n$, let $r_0 = 0$ and $r_k = n$, you need to find $(k-1)$ integers $r_1, r_2, \cdots, r_{k-1}$ such that $r_0 < r_1 < r_2 < \cdots < r_{k-1} < r_k$ and maximize

$$\sum_{i=1}^{k} i \times (\sum_{j=r_{i-1}+1}^{r_i} a_j)$$

Input

There are multiple test cases. The first line of the input contains an integer T indicating the number of test cases. For each test case:

The first line contains one integer n ($1 \le n \le 5 \times 10^5$) indicating the length of the sequence.

The second line contains n integers $a_1, a_2, \cdots, a_n$ ($-10^6 \le a_i \le 10^6$) indicating the sequence.

It's guaranteed that the sum of n of all test cases will not exceed 5×10^5.

Output

For each test case, output one line containing n integers $v_1, v_2, \cdots, v_n$ separated by a space, where v_i is the answer for $k = i$.

Example

standard input	standard output
2 6 1 3 -4 5 -1 -2 1 100	2 4 5 3 1 -2 100

Note

For the first sample test case, consider $k = 3$, we can divide the sequence into $\{\{1\}, \{3, -4\}, \{5, -1, -2\}\}$. The answer is $1 \times 1 + 2 \times (3 - 4) + 3 \times (5 - 1 - 2) = 5$.