Problem I. Distance

Input file: standard input
Output file: standard output

There are n points on a horizontal line, labelled with 1 through n from left to right.

The distance between the i-th point and the $(i+1)$-th point is a_i.

For each integer k ranged from 1 to n, you are asked to select exactly k different given points on the line to maximize the sum of distances between all pairs of selected points.

Input

The input contains several test cases, and the first line contains a positive integer T indicating the number of test cases which is up to 1000.

For each test case, the first line contains an integer n indicating the number of points, where $2 \leq n \leq 10^5$.

The second line contains $(n-1)$ positive integers $a_1, a_2, \cdots, a_{n-1}$, where $1 \leq a_i \leq 10^4$.

We guarantee that the sum of n in all test cases is up to 10^6.

Output

For each test case, output a line containing n integers, the i-th of which is the maximum sum of distances in case $k = i$. You should output exactly one whitespace between every two adjacent numbers and avoid any trailing whitespace in this line.

Example

standard input	standard output
1 5 2 3 1 4	0 10 20 34 48

Note

The figure below describes the sample test case.



The only best selection for $k = 2$ should choose the leftmost and the rightmost points, while a possible best selection for $k = 3$ could contain any extra point in the middle.

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