

Problem I. Three Investigators

Input file: *standard input*
Output file: *standard output*
Time limit: 5 seconds
Memory limit: 512 mebibytes

Chitanda owns a sequence a_1, a_2, \dots, a_n with n integers, and she wants to play a game with Skywalker.

First, Chitanda will select a parameter k and remove $a_{k+1}, a_{k+2}, \dots, a_n$. Thus there will be exactly k integers in sequence a .

Then Skywalker can select a subsequence of a and remove it from a . Assume the selected subsequence is $a_{p_1}, a_{p_2}, \dots, a_{p_m}$. He should ensure that $p_1 < p_2 < \dots < p_m$ and $a_{p_1} \leq a_{p_2} \leq \dots \leq a_{p_m}$.

Skywalker can do the above operation for no more than 5 times. His score is the sum of all the integers selected by him in these no more than 5 operations.

For each possible parameter k selected by Chitanda, write a program to help Skywalker know the maximum score he can achieve.

Input

The first line of the input contains an integer T ($1 \leq T \leq 10\,000$), denoting the number of test cases.

In each test case, there is one integer n ($1 \leq n \leq 100\,000$) on the first line, denoting the length of a .

In the second line of a test case, there are n integers a_1, a_2, \dots, a_n ($1 \leq a_i \leq 10^9$), denoting the sequence.

It is guaranteed that the sum of n in all test cases is at most 500 000.

Output

For each test case, print a single line containing n integers s_1, s_2, \dots, s_n , where s_i denotes the maximum score of Skywalker when $k = i$.

Example

standard input	standard output
1	8 15 21 26 27 30 30 34
8	
8 7 6 5 1 3 2 4	