

A. Highs and Lows

time limit per test: 1 s.
 memory limit per test: 256 MB

Mattox gives you an array a that contains n integers. You can choose any proper subsegment a_l, a_{l+1}, \dots, a_r of this array, such that $1 \leq l \leq r \leq n$, where $r - l + 1 < n$. We define the *score* of a choice of subsegment as the value of the following expression:

$$\max(a_1, a_2, \dots, a_{l-1}, a_{r+1}, a_{r+2}, \dots, a_n) + \max(a_l, \dots, a_r) - \min(a_1, a_2, \dots, a_{l-1}, a_{r+1}, a_{r+2}, \dots, a_n) - \min(a_l, \dots, a_r).$$

Please find the maximum score among all proper subsegments.

Input

The first line contains one integer t ($1 \leq t \leq 1000$) — the number of test cases. Then follow the descriptions of each test case.

The first line of each test case contains a single integer n ($4 \leq n \leq 10^5$) — the length of the array.

The second line of each test case contains n integers a_1, a_2, \dots, a_n ($1 \leq a_i \leq 10^9$) — the elements of the given array.

It is guaranteed that the sum of n over all test cases does not exceed 10^5 .

Output

For each testcase print a single integer — the maximum score of a proper subsegment.

Example

input	Copy
4 8 1 2 2 3 1 5 6 1 5 1 2 3 100 200 4 3 3 3 3 6 7 8 3 1 1 8	
output	Copy
9 297 0 14	

Note

In the first test case, the optimal segment is $l = 7, r = 8$. The score of this segment equals to $(6 - 1) + (5 - 1) = 9$.

In the second test case, the optimal segment is $l = 2, r = 4$. The score of this segment equals $(100 - 2) + (200 - 1) = 297$.

UIUC CS 491 Spring 2025

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- Convex Hull - Preclass
- Number Theory I - Homework
- Line Sweep - Preclass
- Number Theory II - Homework
- Combinatorics - Homework
- Geometry - Preclass
- Geometry - Homework
- Convex Hull - Homework (Extra Credit)
- Rabin Karp - Homework
- Number Theory II - Preclass
- Combinatorics - Preclass
- DP TSP - Homework
- KMP - Homework
- DP Tree - Homework
- Number Theory I - Preclass
- KMP - Preclass
- DP Palindromes - Homework
- Rabin Karp - Preclass
- DP Edit Distance - Homework
- DP Knapsack - Homework
- DP TSP - Preclass
- DP Longest Increasing Subsequence - Homework
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- DP Tree - Preclass
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