Problem M

Maxdifficent Group

Given an array of integers $A_{1..N}$ where $N \geq 2$. Each element in A should be assigned into a group while satisfying the following rules.

- Each element belongs to exactly one group.
- If A_i and A_j where $i < j$ belongs to the same group, then A_k where $i \leq k \leq j$ also belongs to the same group as A_i and A_j.
- There is at least one pair of elements that belong to a different group.

Let G_i denotes the group ID of element A_i. The cost of a group is equal to the sum of all elements in A that belong to that group.

$$\text{cost}(x) = \sum_{i \text{ s.t. } G_i = x} A_i$$

Two different group IDs, G_i and G_j (where $G_i \neq G_j$), are **adjacent** if and only if G_k is either G_i or G_j for every $i \leq k \leq j$. Finally, the $\text{diff}()$ value of two group IDs x and y is defined as the absolute difference between $\text{cost}(x)$ and $\text{cost}(y)$.

$$\text{diff}(x, y) = |\text{cost}(x) - \text{cost}(y)|$$

Your task in this problem is to find a group assignment such that the largest $\text{diff}()$ value between any pair of adjacent group IDs is maximized; you only need to output the largest $\text{diff}()$ value.

For example, let $A_{1..4} = \{100, -30, -20, 70\}$. There are 8 ways to assign each element in A into a group in this example; some of them are shown as follows.

- $G_{1..4} = \{1, 2, 3, 4\}$. There are 3 pairs of group IDs that are adjacent and their $\text{diff}()$ values are:
  - $\text{diff}(1, 2) = |\text{cost}(1) - \text{cost}(2)| = |(100) - (-30)| = 130$,
  - $\text{diff}(2, 3) = |\text{cost}(2) - \text{cost}(3)| = |(-30) - (-20)| = 10$, and
  - $\text{diff}(3, 4) = |\text{cost}(3) - \text{cost}(4)| = |(-20) - (70)| = 90$.

  The largest $\text{diff}()$ value in this group assignment is 130.
- $G_{1..4} = \{1, 2, 2, 3\}$. There are 2 pairs of group IDs that are adjacent and their $\text{diff}()$ values are:
  - $\text{diff}(1, 2) = |\text{cost}(1) - \text{cost}(2)| = |(100) - (-30 + (-20))| = 150$, and
  - $\text{diff}(2, 3) = |\text{cost}(2) - \text{cost}(3)| = |(-30 + (-20)) - (-20)| = 70$.

  The largest $\text{diff}()$ value in this group assignment is 150.

The other 6 group assignments are: $G_{1..4} = \{1, 1, 1, 2\}$, $G_{1..4} = \{1, 1, 2, 2\}$, $G_{1..4} = \{1, 2, 2, 2\}$, $G_{1..4} = \{1, 1, 2, 2\}$, $G_{1..4} = \{1, 1, 2, 3\}$, and $G_{1..4} = \{1, 2, 3, 3\}$. Among all possible group assignments in this example, the maximum largest $\text{diff}()$ that can be obtained is 150 from the group assignment $G_{1..4} = \{1, 2, 2, 3\}$.

Input

Input begins with a line containing an integer N ($2 \leq N \leq 100\,000$) representing the number of elements in array A. The next line contains N integers A_i ($-10^6 \leq A_i \leq 10^6$) representing the array A.

Output

Output contains an integer in a line representing the maximum possible largest $\text{diff}()$ that can be obtained from a group assignment.

Sample Input #1

```
4
100 -30 -20 50
```

Sample Output #1

```
150
```

Explanation for the sample input/output #1

This is the example from the problem statement.

Sample Input #2

```
5
12 7 4 32 9
```

Sample Output #2

```
46
```

Explanation for the sample input/output #2

The maximum possible largest $\text{diff}()$ of 45 can be obtained from the group assignment $G_{1..5} = \{1, 1, 1, 1, 2\}$. The $\text{diff}()$ value of the only adjacent group IDs is: $\text{diff}(1, 2) = 45$.

Sample Input #3

```
6
-5 10 -5 45 -20 15
```

Sample Output #3

```
70
```

Explanation for the sample input/output #3

The maximum possible largest $\text{diff}()$ of 70 can be obtained from the group assignment $G_{1..6} = \{1, 2, 2, 2, 3, 4\}$. The $\text{diff}()$ values of any two adjacent group IDs are: $\text{diff}(1, 2) = 55$, $\text{diff}(2, 3) = 70$, and $\text{diff}(3, 4) = 35$.