



Hello, 2024101067.

# Mathematical Problem

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You are given an array  $A$  of integers of size  $n$ .

Compute the value of,

$$S = \sum_{i=1}^n \sum_{j=i}^n (\max(A_i, A_{i+1}, \dots, A_j) - \min(A_i, A_{i+1}, \dots, A_j))$$

In other words, compute the sum of  $\max - \min$  over all **subarrays** of  $A$ .

**Note:** A **subarray** is a contiguous sequence of elements within an array.

Formally, a subarray  $A[l \dots r]$  consists of all elements from index  $l$  to  $r$  while maintaining their relative order.

## Input Format:

- The first line contains an integer  $n$ , the size of the array.
- The second line contains  $n$  space-separated integers representing the elements of the array  $A$ .

## Output Format:

- Output a single integer, the computed sum  $S$ .

## Constraints

- $1 \leq n \leq 5 \times 10^2$  [10 PTS]
- $1 \leq n \leq 5 \times 10^3$  [20 PTS]
- $1 \leq n \leq 5 \times 10^6$  [70 PTS]
- $1 \leq a_i \leq 10^5$





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### Input

```
3
3 1 4
```

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### Output

```
8
```

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### Example 2

#### Input

```
5
1 2 3 4 5
```

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#### Output

```
20
```

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### Example 3

#### Input

```
5
1 2 1 2 1
```

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#### Output

```
10
```

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### Explanation for Example 1

The subarrays of `[3, 1, 4]` and their corresponding values are:

subarray	$max$	$min$	$max - min$
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[3]	3	3	0
[3, 1]	3	1	2
[3, 1, 4]	4	1	3
[1]	1	1	0
[1, 4]	4	1	3
[4]	4	4	0

## ? Clarifications

[Request clarification](#)

No clarifications have been made at this time.