

# The Maximum Subarray

## Problem Statement

Given an array  $A = \{a_1, a_2, \dots, a_N\}$  of  $N$  elements, find the maximum possible sum of a

1. Contiguous subarray
2. Non-contiguous (not necessarily contiguous) subarray.

Empty subarrays/subsequences should not be considered.

This Youtube video by Ben Wright might be useful to understand the *Kadane algorithm* for the maximum subarray in a  $1-D$  sequence.

## Input Format

First line of the input has an integer  $T$ .  $T$  cases follow.

Each test case begins with an integer  $N$ . In the next line,  $N$  integers follow representing the elements of array  $A$ .

## Constraints:

- $1 \leq T \leq 10$
- $1 \leq N \leq 10^5$
- $-10^4 \leq a_i \leq 10^4$

**The subarray and subsequences you consider should have at least one element.**

## Output Format

Two, space separated, integers denoting the maximum contiguous and non-contiguous subarray. At least one integer should be selected and put into the subarrays (this may be required in cases where all elements are negative).

## Sample Input

```
2
4
```

```
1 2 3 4
6
2 -1 2 3 4 -5
```

## Sample Output

```
10 10
10 11
```

## Explanation

In the first case:

The max sum for both contiguous and non-contiguous elements is the sum of ALL the elements (as they are all positive).

In the second case:

[2 -1 2 3 4] --> This forms the contiguous sub-array with the maximum sum.

For the max sum of a not-necessarily-contiguous group of elements, simply add all the positive elements.