Maximum Difference in an Array

🏆 Points: 75   ✅ 14 test cases (1 sample)

Coding   🏷 | Data Structures | **MEDIUM** | Algorithms | Arrays | Core Skills | Problem Solving |

You are given an array of integers and must compute the maximum difference between any item and any lower indexed smaller item for all the possible pairs, i.e., for a given array a find the maximum value of *a[j]* - *a[i]* for all *i, j* where $0 \le i < j < n$ and *a[i]* < *a[j]*. If no item has a smaller item with a lower index then return -1.

For example, given an array [1, 2, 6, 4], you would first compare 2 to the elements to its left. 1 is smaller, so calculate the difference 2 - 1 = 1. 6 is bigger than 2 and 1, so calculate the differences 4 and 5. 4 is only bigger than 2 and 1, and the differences are 2 and 3. The largest difference was 6 - 1 = 5.

Function Description

Complete the function *maxDifference* in the editor below. The function must return an integer representing the maximum difference in *a*.

maxDifference has the following parameter(s):
  a[a[0],a[1],...a[n-1]]: an array of integers

Constraints

- $1 \le n \le 2 \times 10^5$
- $-10^6 \le a[i] \le 10^6 \ \forall \ i \in [0, n-1]$

▼ Input Format For Custom Testing

Input from stdin will be processed as follows and passed to the function:

The first line contains a single integer, n, denoting the number of elements in the array a.

Each of the n subsequent lines contains a single integer describing element a[i] where $0 \le i < n$.

Sample Input 0

```
7
2
3
10
2
4
8
1
```

Sample Output

```
8
```

Explanation

$n = 7$, $a = [2, 3, 10, 2, 4, 8, 1]$

Differences are calculated as:

- 3 - [2] = [1]
- 10 - [3, 2] = [7, 8]
- 4 - [2, 3, 2] = [2, 1, 2]
- 8 - [4, 2, 3, 2] = [4, 6, 5, 6]

The maximum is found at 10 - 2 = 8.

Sample Input 1

```
6
7
9
5
6
3
2
```

Sample Output

```
2
```

Click bar to open/close the example.

Explanation

$n = 6$, $a = [7, 9, 5, 6, 3, 2]$

Differences are calculated as:

- 9 - [7] = 2
- 6 - [5] = 1

The maximum difference is 2.