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PAINLESS

MaxProfit

START

Given a log of stock prices compute the maximum possible earning.

Programming language: C++ ▼

Human language: English ▼

A zero-indexed array A consisting of N integers is given. It contains daily prices of a stock share for a period of N consecutive days. If a single share was bought on day P and sold on day Q , where $0 \leq P \leq Q < N$, then the *profit* of such transaction is equal to $A[Q] - A[P]$, provided that $A[Q] \geq A[P]$. Otherwise, the transaction brings *loss* of $A[P] - A[Q]$.

For example, consider the following array A consisting of six elements such that:

$$\begin{aligned} A[0] &= 23171 \\ A[1] &= 21011 \\ A[2] &= 21123 \\ A[3] &= 21366 \\ A[4] &= 21013 \\ A[5] &= 21367 \end{aligned}$$

If a share was bought on day 0 and sold on day 2, a loss of 2048 would occur because $A[2] - A[0] = 21123 - 23171 = -2048$. If a share was bought on day 4 and sold on day 5, a profit of 354 would occur because $A[5] - A[4] = 21367 - 21013 = 354$. Maximum possible profit was 356. It would occur if a share was bought on day 1 and sold on day 5.

Write a function,

```
int solution(vector<int> &A);
```

that, given a zero-indexed array A consisting of N integers containing daily prices of a stock share for a period of N consecutive days, returns the maximum possible profit from one transaction during this period. The function should return 0 if it was impossible to gain any profit.

For example, given array A consisting of six elements such that:

Sieve of
Eratosthenes

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Euclidean
algorithm

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numbers

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Binary search
algorithm

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programming

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Future training

A[0] = 23171
A[1] = 21011
A[2] = 21123
A[3] = 21366
A[4] = 21013
A[5] = 21367

the function should return 356, as explained above.

Assume that:

- N is an integer within the range [0..400,000];
- each element of array A is an integer within the range [0..200,000].

Complexity:

- expected worst-case time complexity is $O(N)$;
- expected worst-case space complexity is $O(1)$, beyond input storage (not counting the storage required for input arguments).

Elements of input arrays can be modified.

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