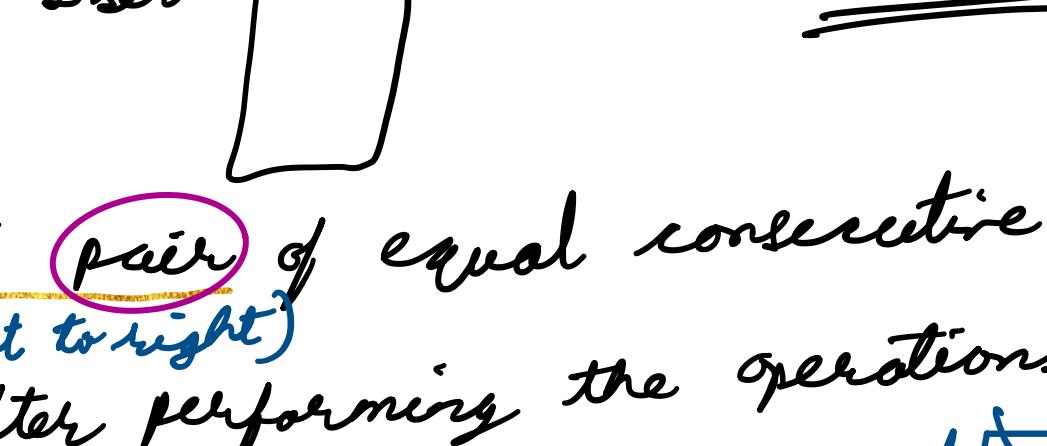


Q → Given a string s .



Operation → Remove first pair of equal consecutive characters. (left to right)

Return the final string after performing the operations multiple times till it is possible.

$$ab\boxed{cd} \rightarrow abd$$

$$\text{Ex: } ab\cancel{b}ccd \rightarrow a\cancel{c}cd \rightarrow \underline{ad} \text{ (Ans)} \quad \text{Create to operations}$$

$$\Rightarrow ab\cancel{b}ccd \rightarrow ab\cancel{c}cd \rightarrow \underline{abd} \text{ (Ans)} \quad \text{sequentially.}$$

$$\Rightarrow ab\cancel{c}cb \rightarrow ab\cancel{b}d \rightarrow \underline{ad} \text{ (Ans)} \quad TC = O(N^2)$$

$$\Rightarrow ab\cancel{b}bbd \rightarrow ab\cancel{b}d \rightarrow \underline{ad} \text{ (Ans)} \quad \text{more #operations} \rightarrow \frac{N}{2}$$

ab**c**ba

$$\Rightarrow ab\cancel{c}d\cancel{e}\cancel{c}\cancel{x}\cancel{d} \quad aabbxxdod$$

$$ab\cancel{a}\cancel{a}\cancel{b}\cancel{x}\cancel{x}dabd \rightarrow \underline{adad} \text{ (Ans)}$$

Not to travel for every operation

$$\begin{array}{ccccccc} a & b & c & d & e & \cancel{c} & \cancel{x} \\ \downarrow & \downarrow & \downarrow & \downarrow & \downarrow & \downarrow & \downarrow \\ d & a & d & a & \cancel{d} & \cancel{a} & \cancel{d} \end{array} \xrightarrow{\text{reverse}} \underline{adad} \text{ (Ans)} \quad TC = O(N) \quad SC = O(N)$$

Q → $2+3-5$

$$\begin{array}{c} 8 \times 6 \\ \downarrow \quad \downarrow \\ 01 \quad 02 \\ \text{operator} \end{array} \rightarrow \text{Infix} \quad [\text{operator 1 operand operand 2}]$$

$$\text{Postfix} \quad [\text{operand 1 operand 2 operator}] \quad [8 6 \times]$$

$$[6, 3, -] \rightarrow 6 - 3 = \underline{3} \text{ (Ans)}$$

Solve the given postfix expression.

$$[2, 1, +, 3, *] \rightarrow 2 + 1 = 3 \rightarrow 3 * 3 = \underline{9} \text{ (Ans)}$$

$$\begin{array}{c} [3, 5, +, 2, -, 2, 5, +, -] \\ \downarrow \quad \downarrow \quad \downarrow \quad \downarrow \quad \downarrow \quad \downarrow \quad \downarrow \\ 0 \quad 1 \quad 2 \quad 3 \quad 4 \quad 5 \quad 6 \quad 7 \quad 8 \quad 9 \quad 10 \quad 11 \quad 12 \quad 13 \quad 14 \quad 15 \end{array} \quad \begin{array}{l} \text{pop 1} \rightarrow \text{operand 2} \\ \text{pop 2} \rightarrow \text{operand 1} \\ \text{pop 2 operation pop 1} \end{array}$$

$$p1 = st.pop(); \leftarrow$$

$$p2 = st.pop(); \leftarrow$$

$$st.push(p2 \oplus p1);$$

Q → Nearest Smaller Element on left

Given an integer array, find nearest smaller element on left.

$$\begin{array}{c} A \rightarrow [0, 1, 2, 3, 4, 5] \\ Ans \rightarrow [-1, 4, -1, 2, 10, -1] \end{array} \quad \begin{array}{l} \forall i \text{ find } A[j] \text{ s.t. } A[j] < A[i] \text{ on left} \\ \text{smaller } A[j] < A[i], j < i \\ j \text{ is max possible value.} \end{array}$$

Create → $\forall i$ check for $A[j]$ satisfying \rightarrow

$$TC = O(N^2)$$

$$\begin{array}{c} x \quad 0 \quad 1 \quad 2 \quad 3 \quad 4 \quad 5 \quad \dots \\ \downarrow \quad \downarrow \quad \downarrow \quad \downarrow \quad \downarrow \quad \downarrow \quad \dots \\ 5, 2, 10, 8, \dots \end{array} \quad \begin{array}{c} x > 2 \quad \cancel{x > 10} \\ \cancel{x > 2} \quad x > 10 \end{array}$$

$$\begin{array}{c} Ans \rightarrow -1, 4, -1, 2, 10, -1 \\ \downarrow \quad \downarrow \quad \downarrow \quad \downarrow \quad \downarrow \quad \downarrow \\ 5 < 8 \quad 2 < 8 \quad x > 5 \Rightarrow x > 2 \quad \checkmark \end{array}$$

$$TC = O(N)$$

$$SC = O(N)$$

$$A \rightarrow [15, 6, 10, 11, 7, 5, 3, 5] \quad Ans \rightarrow [-1, 4, 6, 10, 6, 7, -1, 3] \quad \checkmark$$

Travel from right to left. Nearest smaller or equal on left

for ($i = 0; i < n; i++$) { Nearest greater on left }

 while (!st.isEmpty() & st.top() $>= A[i])$ { Nearest greater or equal on left }

 st.pop();

 if (st.isEmpty()) ans[i] = -1;

 else ans[i] = st.top();

 st.push(A[i]);

}

Q → Given an integer array.

Find $(\max - \min) \times$ subarray of the given array & sum it up

to get the answer. continuous segment of array

$$\begin{array}{c} A \rightarrow [2, 5, 3] \rightarrow [2] \rightarrow (2 - 2) = 0 \quad Ans \\ \downarrow \quad \downarrow \quad \downarrow \quad \downarrow \quad \downarrow \quad \downarrow \\ 1 + 3 + 2 + 1 = 7 \end{array} \quad \begin{array}{c} (1 - 3) \times 2 = -4 \\ + \\ (1 - 2) \times 3 = -3 \\ + \\ (4 - 1) \times 5 = 15 \\ \hline 8 \quad \checkmark \end{array}$$

$$\# \text{subarrays} = \leq N = \frac{N \times (N+1)}{2}$$

$$1 \times 2 \times 3 \times \dots \times N \rightarrow TC = O(N^2)$$

$$\text{contribution} \quad ans = \sum_{i=0}^{n-1} (\# \text{subarray} \text{ in which } A[i] \text{ is max}) - (\# \text{subarray} \text{ in which } A[i] \text{ is min})$$

$$O(N)$$

$$\begin{array}{c} [2, 13, 8, 7] \\ \downarrow \quad \downarrow \quad \downarrow \quad \downarrow \\ 5 \end{array} \quad O(1)$$

$$\begin{array}{c} \text{max} \rightarrow [5], [5, 4] \\ \text{min} \rightarrow [5], [8, 5], [13, 8, 5] \end{array}$$

$$\Rightarrow A \rightarrow [12, 10, 12, 8, 12, 7, 5, 11] \quad \begin{array}{c} \text{start} \quad \text{end} \\ \downarrow \quad \downarrow \\ R \end{array}$$

$$\begin{array}{c} \text{Nearest greater on left} \quad \text{Nearest greater on right} \\ \downarrow \quad \downarrow \\ 10 \quad 8 \quad 9 \quad 6 \quad 5 \quad 100 \end{array}$$

$$\begin{array}{c} \# \text{subarrays} = (j-i) \times (k-i) \\ \downarrow \quad \downarrow \\ i \quad k \end{array}$$

$$\begin{array}{c} i \rightarrow \text{nearest smaller on left} \\ \downarrow \quad \downarrow \\ 10 \quad 8 \quad 9 \quad 6 \quad 5 \quad 100 \end{array}$$

$$\begin{array}{c} j \rightarrow \text{current} \\ \downarrow \quad \downarrow \\ 10 \quad 8 \quad 9 \quad 6 \quad 5 \quad 100 \end{array}$$

$$\begin{array}{c} k \rightarrow \text{nearest smaller on right} \\ \downarrow \quad \downarrow \\ 10 \quad 8 \quad 9 \quad 6 \quad 5 \quad 100 \end{array}$$

$$\begin{array}{c} \max \quad \min \\ \downarrow \quad \downarrow \\ 10 \quad 8 \quad 9 \quad 6 \quad 5 \quad 100 \end{array}$$

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