

C++ Programming

1D Arrays Homework 1

Mostafa S. Ibrahim

Teaching, Training and Coaching since more than a decade!

Artificial Intelligence & Computer Vision Researcher

PhD from Simon Fraser University - Canada

Bachelor / Msc from Cairo University - Egypt

Ex-(Software Engineer / ICPC World Finalist)



Homework 1: Search for a number

- Read an Integer N, then read $N \leq 200$ integers $[0 \leq A[i] \leq 500]$.
 - We will search in this array for numbers
- Then read integer Q (for a number of queries), then read Q integers
 - For each integer, find the **last occurrence** in the array. Print its index
 - If doesn't exist, print -1
- Input 5 1 2 7 3 7 3 7 9 2
 - Means Array of 5 numbers (1 2 7 3 7) and 3 queries (7 9 2)
- Output
 - 4 [7 exists in 2 positions (2 and 4). The last is 4]
 - -1 [9 doesn't exist]
 - 1 [2 exists only in position 1]
- Easy with nested loops. Can you do with 1 loop?

Homework 2: Is increasing array?

- Read an Integer N, then read N \leq 200 integers. Print YES if the array is increasing. Array is increasing if every element is \geq the previous number
- Inputs
 - 4 1 2 2 5 \Rightarrow YES
 - 5 1 0 7 8 9 \Rightarrow NO [0 is $<$ 1, the previous number]
 - 2 -10 10 \Rightarrow YES

Homework 3: Replace MinMax

- Given a number N and an array A of N numbers. Assume all values [0, 2000]
- Print the array after doing the following operations:
 - Find minimum number in these numbers.
 - Find maximum number in these numbers.
 - Replace **each** minimum number with maximum number and Vice Versa.
- Input \Rightarrow Output
 - 7 4 **1** 3 10 8 **10 10** \Rightarrow 4 10 3 1 8 1 1

Homework 4: Find the 3 minimum values

- Read integer N (≥ 3), then read N integers. Find the 3 lowest numbers.
 - Don't change the array content
 - Don't iterate on the array more than once
- Input \Rightarrow Output
 - 5 4 1 3 10 8 \Rightarrow 1 3 4
 - 3 7 9 -2 \Rightarrow -2 7 9

Homework 5: Smallest pair

- Given a number N (≤ 200) and an array A of N numbers.
- Print the smallest possible result of $A[i] + A[j] + j - i$, where $1 \leq i < j \leq N$.
- Input \Rightarrow Output
 - 4 20 1 9 4 \Rightarrow 7

Homework 6: Is Palindrome?

- Given a number N and an array A of N numbers. Determine if it's palindrome or not.
- *An array is called palindrome if it reads the same backward and forward*
 - *for example, arrays $\{ 1 \}$ and $\{ 1,2,3,2,1 \}$ are palindrome*
 - *while arrays $\{ 1,12 \}$ and $\{ 4,7,5,4 \}$ are not.*
- Inputs \Rightarrow Outputs
 - $5\ 1\ 3\ 2\ 3\ 1 \Rightarrow \text{YES}$
 - $4\ 1\ 2\ 3\ 4 \Rightarrow \text{NO}$

Homework 7: Find most frequent number

- Read an Integer N, then read $N \leq 200$ integers. Find the value that repeated the most number of times.
 - Each integer is $-500 \leq \text{integer} \leq 270$
- Example for array: 7 -1 2 -1 3 -1 5 5
 - -1 repeated 3 times: the largest
- Don't use nested loops

Homework 8: Digits frequency

- Read an Integer N, then read $N \leq 200$ integers. For all the digits from 0 to 9, we want to know how many times appeared
 - Input 2 78 307
 - Output:
 - 0 1
 - 1 0 [digit 1 never appeared]
 - 2 0
 - 3 1
 - 4 0
 - 5 0
 - 6 0
 - 7 2 [digit 7 appeared twice]
 - 8 1
 - 9 0

“Acquire knowledge and impart it to the people.”

“Seek knowledge from the Cradle to the Grave.”