05 - List in Python

Ex. No. : 5.1 Date:1.5.24

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Balanced Array

Given an array of numbers, find the index of the smallest array element (the pivot), for which the sums of all elements to the left and to the right are equal. The array may not be reordered.

Example

```
arr=[1,2,3,4,6]
```

- the sum of the first three elements, 1+2+3=6. The value of the last element is 6.
- Using zero based indexing, arr[3]=4 is the pivot between the two subarrays.
- The index of the pivot is 3.

Constraints

- $3 \le n \le 10^5$
- $1 \le \operatorname{arr}[i] \le 2 \times 10^4$, where $0 \le i < n$
- It is guaranteed that a solution always exists.

The first line contains an integer n, the size of the array arr.

Each of the next n lines contains an integer, arr[i], where $0 \le i < n$.

Sample Case 0

```
Sample Input 0
```

4

1

2

3

Sample Output 0

2

Explanation 0

The sum of the first two elements, 1+2=3. The value of the last element is 3

Using zero based indexing, arr[2]=3 is the pivot between the two subarrays

The index of the pivot is 2

Sample Case 1

Sample Input 1

3

1 2

1

Sample Output 1



Explanation 1
The first and last elements are equal to 1
Using zero based indexing, arr[1]=2 is the pivot between the two subarrays
The index of the pivot is 1.

For example:

Input	Result
4 1 2 3 3	2
3 1 2 1	1

Program:

```
a=int(input())
l=[]
for i in range(a):
    c=int(input())
    l.append(c)
for i in range(1,a):
    d=sum(l[0:i])
    r=sum(l[i+1:])
    if(d==r):
        print(i)
```



Ex. No. : 5.2 Date:1.5.24

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Check pair with difference k

Given an array A of sorted integers and another non negative integer k, find if there exists 2 indices i and j such that A[i] - A[j] = k, i != j.

Input Format

- 1. First line is number of test cases T. Following T lines contain:
- 2. N, followed by N integers of the array
- 3. The non-negative integer k

Output format

Print 1 if such a pair exists and 0 if it doesn't

Output:

1 Inյ

4

Input 1

3 1

3 5

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Output

0

For example:

Input	Result
1	1
3	
1	
3	
5	
4	

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Input	Result
1	0
3	
1	
3	
3 5 99	
99	

Program:

```
a=int(input())
while(a!=0):
  b=int(input())
  l=[]
  f=0
  for i in range(b):
     c=int(input())
     l.append(c)
  k=int(input())
  a-=1
  for i in range(b):
     for j in range(b):
        if(l[i]-l[j]==k \text{ and } i!=j):
          break
  if(f==1):
     print(1)
  else:
     print(0)
```

~	1	1	1	~
	3			
	3 5			
	4			
~	1	0	0	~
	3 1			
	3 5			
	99			



Ex. No. : 5.3 Date:1.5.24

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Count Elements

Complete the program to count frequency of each element of an array. Frequency of a particular element will be printed once.

Sample Test Cases

Test Case 1

Input

7

23

45

23

56

45

23

40

Output

23 occurs 3 times

45 occurs 2 times

56 occurs 1 times

40 occurs 1 times

Program:

import collections

def CountFrequency(arr):

return collections. Counter(arr)

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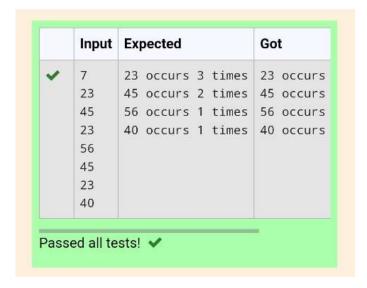
```
if __name__ == "__main__":
    # Input size of array
    n = int(input())

# Input elements in array
arr = []
for _ in range(n):
    ele = int(input())
arr.append(ele)

# Calculate frequency of each element
freq = CountFrequency(arr)

for key, value in freq.items():
    print(f"{key} occurs {value} times")
```

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Distinct Elements in an Array

Program to print all the distinct elements in an array. Distinct elements are nothing but the unique (non-duplicate) elements present in the given array.

Input Format:

First line take an Integer input from stdin which is array length n.

Second line take n Integers which is inputs of array.

Output Format:

Print the Distinct Elements in Array in single line which is space Separated

```
5
1
2
2
3
4
Output:
1234
Example Input:
1
1
2
2
3
3
Output:
123
For example:
Input Result
5
1
2
2
3
4
1234
6
```

1

Example Input:



Program:

```
def merge_arrays_without_duplicates(arr1, arr2):
  # Combine the arrays and convert to a set to remove duplicates
  result\_set = set(arr1 + arr2)
  # Convert the set back to a sorted list
  merged_sorted_array = sorted(result_set)
  return merged_sorted_array
# Input read and processing
def process_input():
  # Reading number of elements and the elements for the first array
  n1 = int(input())
  array1 = []
  for \underline{\phantom{a}} in range(n1):
     element = int(input())
     array1.append(element)
  # Reading number of elements and the elements for the second array
  n2 = int(input())
  array2 = []
  for \underline{\phantom{a}} in range(n2):
     element = int(input())
```



```
array2.append(element)
# Merge the arrays without duplicates
result = merge_arrays_without_duplicates(array1, array2)
# Print the result
print(" ".join(map(str, result)))
```

	Input	E	хр	ec	tec	1							
~	5 1 2 3 6 9 4 2 4 5	1	2	3	4	5	6	9	10				
~	7 4 7 8 10 12 30 35 9 1 3 4 5 7 8 11 13	1	3	4	5	7	8	10	11	12	13	22	3

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Element Insertion

Consider a program to insert an element / item in the sorted array. Complete the logic by filling up required code in editable section. Consider an array of size 10. The eleventh item is the data is to be inserted.

Sample Test Cases	33
Test Case 1	55
Input	66
1	77
3	88
4	99
5	110
6	120
7	44
8	11
9	Output
10	o acp ac
11	ITEM to be inserted:44
2	After insertion array is:
-	11
Output	$\frac{1}{22}$
ITEM to be inserted:2	33
After insertion array is:	44
1	55
2	66
3	77
4	88
5	99
6	110
7	120
8	
9	
10	
11	

Test Case 2 Input 11 22



Program: Output:

```
def insert_sorted(list, n):
```

```
list.append(n)
sorted_list = sorted(list)
print("After insertion array is:")
for i in range(11):
    print(sorted_list[i])
```

```
sorted_list = [int(input()) for i in
range(10)]
```

```
new_element = int(input())
```

print("ITEM to be inserted:",
new_element, sep=")

insert_sorted(sorted_list,
new_element)

	Input	Expected	G
~	1	ITEM to be inserted:2	I
	3	After insertion array is:	A
	4	1	1
	5	2	2
	6	3	3
	7	4	4
	8	5	5
	9	6	6
	10	7	7
	11	8	8
	2	9	9
		10	10
		11	11
~	11	ITEM to be inserted:44	1.
	22	After insertion array is:	A-
	33	11	1
	55	22	22
	66	33	33
	77	44	44
	88	55	5
	99	66	66
	110	77	7
	120	88	88
	44	99	99
		110	11
		120	12

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Find the Factor

Determine the factors of a number (i.e., all positive integer values that evenly divide into a number) and then return the pth element of the <u>list</u>, sorted ascending. If there is no pth element, return 0.

Constraints

```
1 \le n \le 10^{15}
1 \le p \le 10^9
```

The first line contains an integer n, the number to factor.

The second line contains an integer p, the 1-based index of the factor to return.

```
Sample Case 0
Sample Input 0
10
3
Sample Output 0
Explanation 0
Factoring n = 10 results in \{1, 2, 5, 10\}. Return the p = 3^{rd} factor, 5, as the
answer.
Sample Case 1
Sample Input 1
10
Sample Output 1
Explanation 1
Factoring n = 10 results in \{1, 2, 5, 10\}. There are only 4 factors and p = 5,
therefore 0 is returned as the answer.
Sample Case 2
Sample Input 2
Sample Output 2
Explanation 2
Factoring n = 1 results in \{1\}. The p = 1st factor of 1 is returned as the answer.
```



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Input	Result
10 3	5
10 5	0
1 1	1

Program:

```
import sys
import math

def find_factors(n):
    factors = []
    for i in range(1, int(math.sqrt(n)) + 1):
    if n % i == 0:
    factors.append(i)
    if i != n // i:
        factors.append(n // i)
    return sorted(factors)

def get_pth_factor(n, p):
    factors = find_factors(n)
```

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if $p \le len(factors)$:

return factors[p - 1]
else:
return 0

Reading input directly from the standard input (typically for competitive programming)

input = sys.stdin.read
data = input().split()
n = int(data[0])
p = int(data[1])

Calculate and print the p-th factor
print(get_pth_factor(n, p))

Output:



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Merge List

Write a Python program to Zip two given lists of lists.

Input:

m : row size n: column size

list1 and list 2: Two lists

Output

Zipped List: List which combined both list1 and list2

Sample test case

Sample input

2

2

1

3

5 7

2

4

6

8

Sample Output

[[1, 3, 2, 4], [5, 7, 6, 8]]

Program:

def zip_lists(list1, list2):

return [row1 + row2 for row1, row2 in zip(list1, list2)]

def main():



```
m = int(input())

n = int(input())

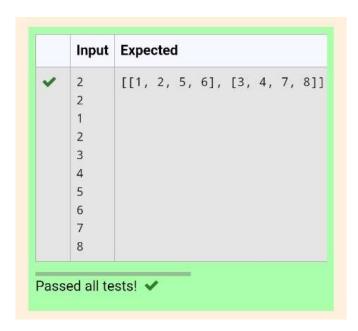
list1 = [[int(input()) for _ in range(n)] for _ in range(m)]

list2 = [[int(input()) for _ in range(n)] for _ in range(m)]

zipped_list = zip_lists(list1, list2)

print(zipped_list)

if __name__ == "__main__":
    main()
```



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Merge Two Sorted Arrays Without Duplication

Output is a merged array without duplicates.

Input Format

N1 - no of elements in array 1

Array elements for array 1

N2 - no of elements in array 2

Array elements for array2

Output Format

Display the merged array

Sample Input 1

5

1

2

3

9

4

2

4

5

10

Sample Output 1

123456910

Program:

def merge_arrays_without_duplicates(arr1, arr2):

Combine the arrays and convert to a set to remove duplicates

 $result_set = set(arr1 + arr2)$



```
# Convert the set back to a sorted list
  merged_sorted_array = sorted(result_set)
  return merged_sorted_array
# Input read and processing
def process_input():
  # Reading number of elements and the elements for the first array
  n1 = int(input())
  array1 = []
  for \underline{\phantom{}} in range(n1):
     element = int(input())
     array1.append(element)
  # Reading number of elements and the elements for the second array
  n2 = int(input())
  array2 = []
  for \_ in range(n2):
     element = int(input())
     array2.append(element)
  # Merge the arrays without duplicates
  result = merge_arrays_without_duplicates(array1, array2)
  # Print the result
```



print(" ".join(map(str, result)))

Output:

	Input	Expected
5 1 2 3 6 9 4 2 4 5 10	1 2 3 4 5 6 9 10	
*	7 4 7 8 10 12 30 35 9 1 3 4 5 7 8 11 13 22	1 3 4 5 7 8 10 11 12 13 22 3

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Print Element Location

Write a program to print all the locations at which a particular element (taken as input) is found in a list and also print the total number of times it occurs in the list. The location starts from 1.

For example, if there are 4 elements in the array: 6 5 If the element to search is 5 then the output will be: 5 is present at location 1 5 is present at location 3 5 is present 2 times in the array. Sample Test Cases Test Case 1 Input 4 5 6 5 7 5 Output 5 is present at location 1. 5 is present at location 3. 5 is present 2 times in the array. Test Case 2 Input 5 67

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```
45
97
100
50
Output
50 is not present in the array.
Program:
def find_element_locations(lst, target):
  locations = []
  count = 0
  for i in range(len(lst)):
     if lst[i] == target:
      locations.append(i + 1)
      count += 1
  return locations, count
def main():
  n = int(input())
  lst = [int(input()) for _ in range(n)]
  target = int(input())
  locations, count = find_element_locations(lst, target)
  if count == 0:
```



```
print(f"{target} is not present in the array.")
else:
    for loc in locations:
        print(f"{target} is present at location {loc}.")
        print(f"{target} is present {count} times in the array.")

if __name__ == "__main__":
    main()
```

	Input	Expected
~	4	5 is present at location 1.
	5	5 is present at location 3.
	6	5 is present 2 times in the
	5	
	7	
	5	
~	5	50 is not present in the arr
	67	
	80	
	45	
	97	
	100	
	50	

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Strictly increasing

Write a Python program to check if a given list is strictly increasing or not. Moreover, If removing only one element from the list results in a strictly increasing list, we still consider the list true

Input:

n: Number of elements

List1: List of values

Output

Print "True" if list is strictly increasing or decreasing else print "False"

Sample Test Case

Input

7

1

2

3

0

4

5

6

Output

True

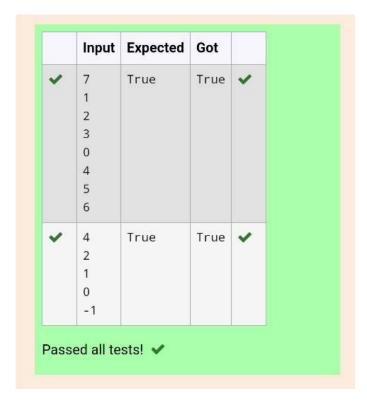
Program:

n=int(input())



```
arr = [int(input()) for i in range(n)]
l = arr.copy()
g=0
size = len(arr)
arr_asc = sorted(arr)
arr_des = sorted(arr)[::-1]
if arr==arr_asc or arr==arr_des:
  print('True')
  g=1
else:
  for i in arr:
     l.remove(i)
     arr_asc.remove(i)
     arr_des.remove(i)
     if l==arr_asc or l==arr_des:
      print('True')
      g=1
      break
     l=arr.copy()
     arr_asc = sorted(arr)
     arr_des = sorted(arr)[::-1]
if g==0:
  print('False')
```





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