
Nicholas Samuel

240801220

Question 1: Reverse a List

Problem Statement:

Given an array of integers, reverse the given array in place using an index and loop rather than a built-in function.

Example

`arr = [1, 3, 2, 4, 5]`

Return the array `[5, 4, 2, 3, 1]` which is the reverse of the input array.

Function Description

Complete the function `reverseArray` in the editor below.

`reverseArray` has the following parameter(s):

`int arr[n]`: an array of integers

Return

`int[n]`: the array in reverse order

Constraints

$1 \leq n \leq 100$

$0 < arr[i] \leq 100$

Input Format For Custom Testing

The first line contains an integer, n , the number of elements in `arr`.

Each line i of the n subsequent lines (where $0 \leq i < n$) contains an integer, `arr[i]`.

Sample Input For Custom Testing

5

1

3

2

4

5

Sample Output

5 4 2 3 1

Explanation

The input array is [1, 3, 2, 4, 5], so the reverse of the input array is [5, 4, 2, 3, 1].

```
35 int* reverseArray(int arr_count, int *arr, int *result_count) {  
36     *result_count = arr_count;  
37     for(int i = 0; i < arr_count/2; i++){  
38         int temp = arr[i];  
39         arr[i] = arr[arr_count-i-1];  
40         arr[arr_count-i-1] = temp;  
41     }  
42     return arr;  
43 }  
44  
45
```

	Test	Expected	Got	
✓	int arr[] = {1, 3, 2, 4, 5}; int result_count; int* result = reverseArray(5, arr, &result_count); for (int i = 0; i < result_count; i++) printf("%d\n", *(result + i));	5 4 2 3 1	5 4 2 3 1	✓

Question 2:

Maximize the Value

Rearrange an array of integers so that the calculated value U is maximized. Among the arrangements that satisfy that test, choose the array with minimal ordering. The value of U for an array with n elements is calculated as:

$U = \text{arr}[1] \times \text{arr}[2] \times (1 \div \text{arr}[3]) \times \text{arr}[4] \times \dots \times \text{arr}[n-1] \times (1 \div \text{arr}[n])$ if n is odd (or)

$U = \text{arr}[1] \times \text{arr}[2] \times (1 \div \text{arr}[3]) \times \text{arr}[4] \times \dots \times (1 \div \text{arr}[n-1]) \times \text{arr}[n]$ if n is even

The sequence of operations is the same in either case, but the length of the array, n , determines whether the calculation ends on $\text{arr}[n]$ or $(1 \div \text{arr}[n])$. Arrange the elements to maximize U and the items are in the numerically smallest possible

order.

Example: $\text{arr} = [5, 7, 9, 21, 34]$

To maximize U and minimize the order, arrange the array as $[9, 21, 5, 34, 7]$ so $U = 9 \times 21 \times (1 \div 5) \times 34 \times (1 \div 7) = 183.6$. The same U can be achieved using several other orders, e.g. $[21, 9, 7, 34, 5] = 21 \times 9 \times (1 \div 7) \times 34 \times (1 \div 5) = 183.6$, but they are not in the minimal order.

Function Description: Complete the function `rearrange` in the editor below.

`rearrange` has the following parameter(s): `int arr[n]`: an array of integers

Returns: `int[n]`: the elements of `arr` rearranged as described

Constraints: $1 \leq n \leq 105$, $1 \leq \text{arr}[i] \leq 109$

Input Format For Custom Testing: The first line contains an integer, n , the number of elements in `arr`. Each line i of the n subsequent lines (where $1 \leq i \leq n$) contains an integer, `arr[i]`.

Sample Input For Custom Testing

STDIN Function

4 → arr[] size n = 4

1 → arr = [1, 2, 3, 4]

2

3

4

Sample Output

2

3

1

4

Explanation

$U = 2 \times 3 \times (1 \div 1) \times 4 = 24$. All other arrangements where $U = 24$ are numerically higher than this array, e.g. $[2, 3, 1, 4] < [3, 4, 1, 2]$.

```
29 char* cutThemAll(int lengths_count, long *lengths, long minLength) {  
30     long t=0, i =1;  
31     for(int i=0; i<=lengths_count-1; i++){  
32         t += lengths[i];  
33     }  
34     do{  
35         if(t-lengths[lengths_count-i-1] < minLength){  
36             return "Impossible";  
37         }  
38         i++;  
39     }while(i<lengths_count-1);  
40     return "Possible";  
41 }  
42  
43
```

Test	Expected	Got	
✓ long lengths[] = {3, 5, 4, 3}; printf("%s", cutThemAll(4, lengths, 9))	Possible	Possible	✓
✓ long lengths[] = {5, 6, 2}; printf("%s", cutThemAll(3, lengths, 12))	Impossible	Impossible	✓