

Given an integer array `nums`, rotate the array to the right by `k` steps, where `k` is non-negative.

Example 1:

Input: `nums = [1,2,3,4,5,6,7]`, `k = 3`  
Output: `[5,6,7,1,2,3,4]`  
Explanation:  
rotate 1 steps to the right: `[7,1,2,3,4,5,6]`  
rotate 2 steps to the right: `[6,7,1,2,3,4,5]`  
rotate 3 steps to the right: `[5,6,7,1,2,3,4]`

*Handwritten notes for Example 1:*

**Public**  $K \rightarrow N$   $\rightarrow$  time  $\leftarrow$

**Without using extra array**

$K=3$   
 $K > 7$

Array: 

3	4	5	6	7	1	2
---	---	---	---	---	---	---

  
0 1 2 3 4 5 6

$K \text{ arr. len}$   $\rightarrow 3$   
 $K=143$   $\rightarrow 143/7 = \square$   
 $K = K \% \text{arr.len}$

1, 2, 3, 4, 5, 6, 7  $\rightarrow$

$K=1$  7 1 2 3 4 5 6  
 $K=2$  6 7 1 2 3 4 5  
 $K=3$  5 6 7 1 2 3 4  
 $K=4$  4 5 6 7 1 2 3  
 $K=5$  3 4 5 6 7 1 2  
 $K=6$  2 3 4 5 6 7 1  
 $K=7$  1 2 3 4 5 6 7  
 $K=8$  7 1 2 3 4 5 6  
 $K=9$  6 7 1 2 3 4 5

```
public static void Rotate(int[] arr, int k) {  
    int n = arr.length;  
    k = k % n;  
    // 1st Rotation ka code  
    for (int j = 1; j <= k; j++) {  
        int item = arr[n - 1];  
        for (int i = n - 2; i >= 0; i--) {  
            arr[i + 1] = arr[i];  
        }  
        arr[0] = item;  
    }  
}
```

$i = n - 1$   $\leftarrow$   
 $i > 5$   $\rightarrow$  arr[6] = arr[5]  $\rightarrow$   
 $i \rightarrow 4$   $\rightarrow$  arr[5] = arr[4]  $\rightarrow$   
 $i \rightarrow 3$   $\rightarrow$  arr[4] = arr[3]  $\leftarrow$   
 $i \rightarrow 2$   $\rightarrow$  arr[3] = arr[2]  $\leftarrow$   
 $i \rightarrow 1$   $\rightarrow$  arr[2] = arr[1]  $\leftarrow$   
 $i \rightarrow 0$   $\rightarrow$  arr[1] = arr[0]  $\leftarrow$   
 $\text{arr}[0] = \text{item}$

*Handwritten notes for Rotate:*

Let  $K$  done  $\checkmark$   
 $n-k$

Array: 

1	2	3	4	5	6	7
---	---	---	---	---	---	---

  
 $\rightarrow$ 

1	2	3	4	7	6	5
---	---	---	---	---	---	---

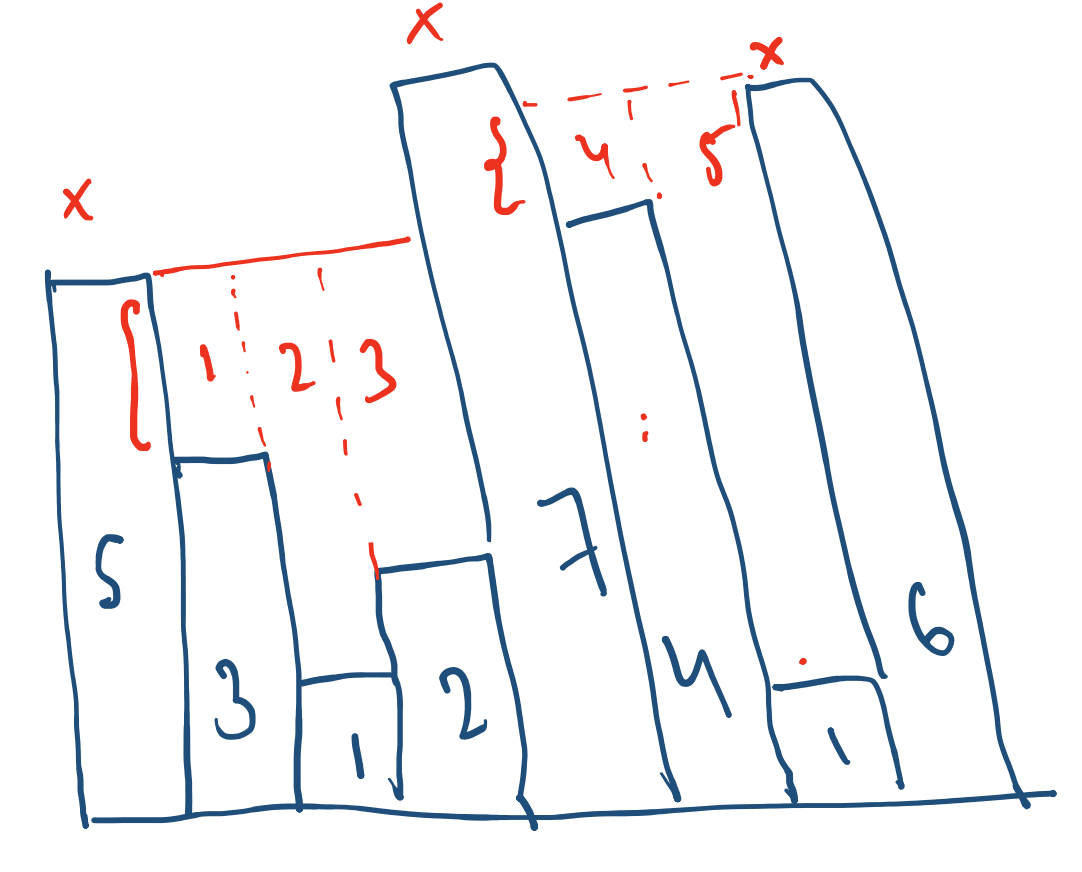
  
 $\rightarrow$ 

4	3	2	1	7	6	5
---	---	---	---	---	---	---

  
 $\rightarrow$  5 6 7 1 2 3 4

$\Sigma$  5, 3, 1, 2, 3, 4, 5, 6  
0 1 2 3 4 5 6 7

$2 + 4 + 3 + 2 + 5 = 16$



$\Sigma$  5, 3, 1, 2, 3, 4, 5, 6  
0 1 2 3 4 5 6 7

for  $i=0$  to  $n-1$  {  
Sum = Sum + min(L[i], R[i]) - arr[i]  
}

Array: 

5	5	5	5	7	7	7	7
---	---	---	---	---	---	---	---

  
0 1 2 3 4 5 6 7

Array: 

7	7	7	7	7	8	6	6
---	---	---	---	---	---	---	---

  
0 1 2 3 4 5 6 7

- $i=0$   $\min(\text{Left}[0], \text{Right}[0]) - \text{arr}[0] = (5, 7) - 5 = 0$
- $i=1$   $\min(\text{Left}[1], \text{Right}[1]) - \text{arr}[1] = (5, 7) - 5 = 2$
- $i=2$   $\min(\text{Left}[2], \text{Right}[2]) - \text{arr}[2] = (5, 7) - 1 = 4$
- $i=3$   $\min(\text{Left}[3], \text{Right}[3]) - \text{arr}[3] = (5, 7) - 2 = 3$
- $i=4$   $\min(\text{Left}[4], \text{Right}[4]) - \text{arr}[4] = (7, 7) - 7 = 0$
- $i=5$   $\min(\text{Left}[5], \text{Right}[5]) - \text{arr}[5] = (7, 8) - 7 = 2$
- $i=6$   $\min(\text{Left}[6], \text{Right}[6]) - \text{arr}[6] = (8, 6) - 6 = 5$
- $i=7$   $\min(\text{Left}[7], \text{Right}[7]) - \text{arr}[7] = (6, 6) - 6 = 0$

$\Sigma$  5, 3, 1, 2, 3, 4, 5, 6  
0 1 2 3 4 5 6 7

Left[i] = max(Left[i-1], arr[i])

Array: 

5	5	5	5	7	7	7	7
---	---	---	---	---	---	---	---

  
0 1 2 3 4 5 6 7

$\text{Left}[i] = \max(\text{Left}[i-1], \text{arr}[i])$

$\text{Left}[0] = \max(\text{Left}[-1], \text{arr}[0])$   
 $\text{Left}[1] = \max(\text{Left}[0], \text{arr}[1])$   
 $\text{Left}[2] = \max(\text{Left}[1], \text{arr}[2])$   
 $\text{Left}[3] = \max(\text{Left}[2], \text{arr}[3])$   
 $\text{Left}[4] = \max(\text{Left}[3], \text{arr}[4])$   
 $\text{Left}[5] = \max(\text{Left}[4], \text{arr}[5])$   
 $\text{Left}[6] = \max(\text{Left}[5], \text{arr}[6])$   
 $\text{Left}[7] = \rightarrow$

$\Sigma$  5, 3, 1, 2, 3, 4, 5, 6  
0 1 2 3 4 5 6 7

$\text{Right}[i] = \max(\text{Right}[i+1], \text{arr}[i])$

Array: 

7	7	7	7	7	6	6	6
---	---	---	---	---	---	---	---

  
0 1 2 3 4 5 6 7

for  $i=n-2$  to  $0$  {  
 $\text{Right}[i] = (\text{Right}[i+1], \text{arr}[i])$  max  
}

$\text{Right}[5] = \max(\text{Right}[6], \text{arr}[5])$   
 $\text{Right}[4] = \max(\text{Right}[5], \text{arr}[4])$   
 $\text{Right}[3] = \max(\text{Right}[4], \text{arr}[3])$   
 $\text{Right}[2] = \max(\text{Right}[3], \text{arr}[2])$   
 $\text{Right}[1] = \max(\text{Right}[2], \text{arr}[1])$   
 $\text{Right}[0] = \max(\text{Right}[1], \text{arr}[0])$

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$\text{Left}[i] = \text{Left}[i-1] \times \text{arr}[i]$

Array: 

2	3	1	4
---	---	---	---

  
 $\rightarrow$ 

1	2	6	24
---	---	---	----

  
 $\rightarrow$ 

60	20	5	1
----	----	---	---

  
 $\rightarrow$ 

60	40	20	7
----	----	----	---

$\text{Right}[i] = \text{Right}[i+1] \times \text{arr}[i]$

Array: 

1	2	6
---	---	---

  
0 1 2 3

Array: 

1	2	6	1
---	---	---	---

  
0 1 2 3

```
public static void main(String[] args) {  
    // TODO Auto-generated method stub  
    int[] arr = {2, 3, 1, 4};  
    int[] a = ProductOfArray(arr);  
    for (int i = 0; i < a.length; i++) {  
        System.out.print(a[i] + " ");  
    }  
}
```