PROBLEM

Minimize the Difference

Medium Accuracy: 54.13% Submissions: 21K+ Points: 4

You are given an array **arr** of size **n**. You have to remove a **subarray** of size **k** , such that the difference between the maximum and minimum values of the **remaining array** is **minimized**.
Find the **minimum** value obtained after performing the operation of the removal of the subarray and return it.

Example 1:

Input:
n = 5
k = 3
arr = {1, 2, 3, 4, 5}
Output:
1
Explanation:
We can remove first subarray of length 3(i.e. {1, 2, 3}) then remaining array will be {4,5} and the difference of maximum and minimum element will be 1 i.e 5 - 4 = 1

Example 2:

Input:
n = 6
k = 3
arr = {2, 3, 1, 4, 6, 7}
Output:
2
Explanation:
If we remove the subarray {2,3,1} then remaining array will be {4,6,7} and the difference = 7-4 = 3
If we remove the subarray {3,1,4} then remaining array will be {2,6,7} and the difference = 7-2 = 5
If we remove the subarray {1,4,6} then remaining array will be {2,3,7} and the difference = 7-2 = 5
If we remove the subarray {4,6,7} then remaining array will be {2,3,1} and the difference = 3-1 = 2
So the answer will be min(3,5,5,2) = 2

Your Task:
You have to complete the function **minimizeDifference( )**, which takes two integers **n** and **k** and an integer array **arr** of size n. You have to return the **minimum difference** of maximum and minimum elements of the remaining array after removing one k length subarray of it.

Expected Time Complexity: O(n)
Expected Auxiliary Space: O(n)

Constraints:
$2 <= n <= 10^5$
$1 <= k <= n-1$
$0 <= arr[i] <= 10^9$

CODE

```
from typing import List



class Solution:
    def minimizeDifference(self, n : int, k : int, arr : List[int]) -> int:
        # code here
        post_max = [0]*n
        post_max[n-1] = arr[n-1]
        post_min = [0]*n
        post_min[n-1] = arr[n-1]
        for i in range(n-2,-1,-1):
            post_max[i] = max(post_max[i+1],arr[i])
            post_min[i] = min(post_min[i+1],arr[i])
        maxi = arr[0]
        mini = arr[0]
        ans = post_max[k] - post_min[k]
        for i in range(1,n-k):
            ans = min(ans, max(maxi,post_max[i+k])-min(mini,post_min[i+k]))
            maxi = max(maxi,arr[i])
            mini = min(mini,arr[i])
        ans = min(ans,maxi-mini)
        return ans
```