



Longest Subarray with Ones after Replacement (hard)

We'll cover the following



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 - Time Complexity
 - Space Complexity

Problem Statement

Given an array containing 0s and 1s, if you are allowed to **replace no more than 'k' 0s with 1s**, find the length of the **longest contiguous subarray having all 1s**.

Example 1:

Input: Array=[0, 1, 1, 0, 0, 0, 1, 1, 0, 1, 1], k=2

Output: 6

Explanation: Replace the '0' at index 5 and 8 to have the longest contiguous subarray of 1s having length 6.

Example 2:

Input: Array=[0, 1, 0, 0, 1, 1, 0, 1, 1, 0, 0, 1, 1], k=3

Output: 9

Explanation: Replace the '0' at index 6, 9, and 10 to have the longest contiguous subarray of 1s having length 9.



Try it yourself

Try solving this question here:



Java



Python3





JS



C++

```
1 def length_of_longest_substring(arr, k):
2     # TODO: Write your code here
3     # start, curr_k, ans
4     start, curr_k, ans = 0, k, 0
5     # when curr_k > 0 expand
6     for i in range(len(arr)):
7         if arr[i] == 0:
8             if curr_k > 0:
9                 curr_k -= 1
10            else:
11                while curr_k <= 0:
12                    if arr[start] == 0:
13                        curr_k += 1
14                    start += 1
15            ans = max(ans, i - start)
16    return ans
17
18 # return answer
19
```

[Show Results](#)[Show Console](#)**2 of 2 Tests Passed**

Result	Input	Expected Output	Actual Output	Reason 	
✓	length_of_longest_substring([0, 1, 1, 0, ...])	6	6	Succeeded	
✓	length_of_longest_substring([0, 1, 0, 0, ...])	9	9	Succeeded	

0.15s

Solution





This problem follows the **Sliding Window** pattern and is quite similar to Longest Substring with same Letters after Replacement

(<https://www.educative.io/collection/page/5668639101419520/5671464854355968/6497958910492672/>). The only difference is that, in the problem, we only have two characters (1s and 0s) in the input arrays.

Following a similar approach, we'll iterate through the array to add one number at a time in the window. We'll also keep track of the maximum number of repeating 1s in the current window (let's call it `maxOnesCount`). So at any time, we know that we can have a window with 1s repeating `maxOnesCount` time, so we should try to replace the remaining 0s. If we have more than 'k' remaining 0s, we should shrink the window as we are not allowed to replace more than 'k' 0s.

Code

Here is how our algorithm will look like:

 Java	 Python3	 C++	 JS
<pre> 1 def length_of_longest_substring(arr, k): 2 window_start, max_length, max_ones_count = 0, 3 4 # Try to extend the range [window_start, window_end] 5 for window_end in range(len(arr)): </pre>			

```
6     if arr>window_end] == 1:
7         max_ones_count += 1
8
9     # Current window size is from window_start to window_end
10    # repeating 'max_ones_count' times, this means we have 'max_ones_count'
11    # ones and the remaining are 0s which should be replaced by 1s
12    # now, if the remaining 0s are more than 'k' then we cannot replace them
13    # are not allowed to replace more than 'k' 0s
14    if (window_end - window_start + 1 - max_ones_count) > k:
15        if arr>window_start] == 1:
16            max_ones_count -= 1
17        window_start += 1
18
19    max_length = max(max_length, window_end - window_start + 1)
20    return max_length
21
22
23 def main():
24     print(length_of_longest_substring([0, 1, 1, 0, 0, 1, 1, 0, 1, 1, 0, 0, 1, 1], 3))
25     print(length_of_longest_substring([0, 1, 0, 0, 1, 1, 0, 1, 1, 0, 0, 1, 1], 3))
26
27
28
```




Time Complexity


The above algorithm's time complexity will be $O(N)$, where 'N' is the count of numbers in the input array.

Space Complexity

The algorithm runs in constant space $O(1)$.

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