

Continuous Subarray Sum

#LeetCode/Medium

#algorithm/cumulative



#algorithm/prefix sum

#algorithm/math

#algorithm/array

523. Continuous Subarray Sum

Solved 

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Given an integer array `nums` and an integer `k`, return `true` if `nums` has a **good subarray** or `false` otherwise.

A **good subarray** is a subarray where:

- its length is **at least two**, and
- the sum of the elements of the subarray is a multiple of `k`.

Note that:

- A **subarray** is a contiguous part of the array.
- An integer `x` is a multiple of `k` if there exists an integer `n` such that `x = n * k`. `0` is **always** a multiple of `k`.

Example 1:

Input: `nums = [23,2,4,6,7]`, `k = 6`

Output: `true`

Explanation: `[2, 4]` is a continuous subarray of size 2 whose elements sum up to 6.

Example 2:

Input: `nums = [23,2,6,4,7]`, `k = 6`

Output: `true`

Explanation: `[23, 2, 6, 4, 7]` is an continuous subarray of size 5 whose elements sum up to 42.
42 is a multiple of 6 because `42 = 7 * 6` and 7 is an integer.

Example 3:

Input: `nums = [23,2,6,4,7]`, `k = 13`

Output: `false`

Idea:- $23 \% 6 = 5$

$$(23 + n \times 6) \% 6 = 5$$

any multiple of 6 added with a number x gives remainder as $x \% 6$.

Use hash map to store the first occurrence of a mod value & check whether the mod value is appearing again in later part of the array.

e.g. $[1, 2, 3]$ $K=6$

Prefix Sum $[1, 3, 0]$ $(3+3)\%6$

$mp[0] = -1$

check $i - mp[\text{prefixSum}] \geq 2$

initialize map with

$mp[0] = -1$

↳ 0 is a multiple of any number.

for good subarray
len shall be ≥ 2 .

e.g. $[23, 2, 4, 6, 7]$ $K=6$

Prefix Sum $5, 7, 11, 17, 0$

$(6+3)\%6$

universal
0

exists a
multiple
of 6

exists a multiple
of 6

Subarray Sum Div by K :-

974. Subarray Sums Divisible by K

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Given an integer array `nums` and an integer `k`, return the number of non-empty **subarrays** that have a sum divisible by `k`.

A **subarray** is a **contiguous** part of an array.

Example 1:

Input: `nums = [4,5,0,-2,-3,1]`, `k = 5`

Output: 7

Explanation: There are 7 subarrays with a sum divisible by `k = 5`:

`[4, 5, 0, -2, -3, 1]`, `[5]`, `[5, 0]`, `[5, 0, -2, -3]`, `[0]`, `[0, -2, -3]`, `[-2, -3]`

Example 2:

Input: `nums = [5]`, `k = 9`

Output: 0

✓ Similar to previous one; but ...
Here For negative number.

$$(sum) \% k = rem \rightarrow \text{if } rem = -ve \\ rem = k + rem$$

in c++ $-9 \% 7 = -2$
 $-2 \% 7 = -2$

#★

#Ma...

✓✓ Map is only used for counting occurrences of mod-value
& No need to check `len(subarray)`