

$$K = 3$$

## Longest Subarray With Sum Divisible By K

{-2, 2, -5, 12, -11, -1, 7}

		-2	2	-5	12	-11	-1	-7
	-1	0	1	2	3	4	5	6
PS	0	-2	0	-5	7	-4	-5	-12
PS % K	0	1	0	1	1	2	1	0

ans: 7 length

$$m \% K = \underline{0 \text{ to } K-1}$$

if (sum < 0) {

sum += K;

}



$$S_i = K \cdot n + x$$

$$S_j = K \cdot m + x$$

$$S_j - S_i = K \cdot m + x - (K \cdot n + x)$$

$$= K(m - n)$$

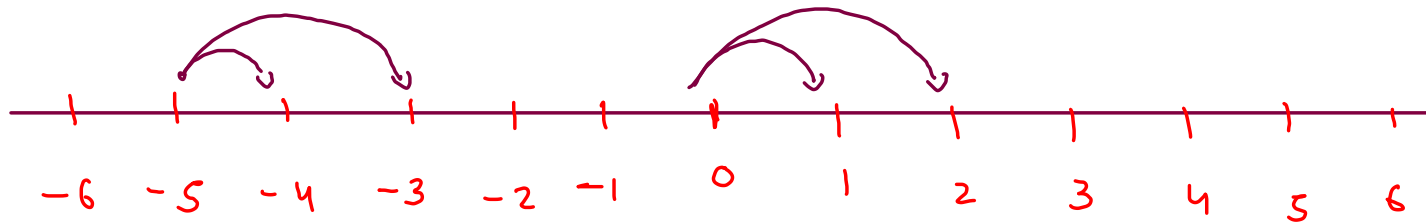
$$k = 5,$$

$$12 \cdot 1 \cdot 5$$

$$-14 \cdot 1 \cdot 5$$

$$9 \cdot 1 \cdot 5$$

$$-8 \cdot 1 \cdot 5$$



$$N = \underline{kn} - \underline{x} + \underline{k} - \underline{k}$$

$$= k(n-1) + (-x + k)$$

$$\begin{array}{l} -14 \rightarrow -10 - 4 \\ -14 \rightarrow -15 + 1 \end{array}$$

## Count Of Subarrays With Sum Divisible By K

```
// arr[] = { -2, 2, -5, 12, -11, -1, -7 }
HashMap<Integer,Integer>map = new HashMap<>(); //ps % k vs freq
int ps = 0;
int count = 0;
map.put(0,1);

for(int i=0; i < arr.length;i++) {
    ps += arr[i];
    int rem = ps % k;

    if(rem < 0) {
        rem += k;
    }

    if(map.containsKey(rem) == true) {
        int of = map.get(rem);
        count += of;
        map.put(rem,of + 1);
    }
    else {
        map.put(rem,1);
    }
}
```

arr[i]	-2	2	-5	12	-11	-1	-7
i	0	1	2	3	4	5	6
PS	-2	0	-5	7	-4	-5	-12
PS % k	1	0	1	1	2	1	0

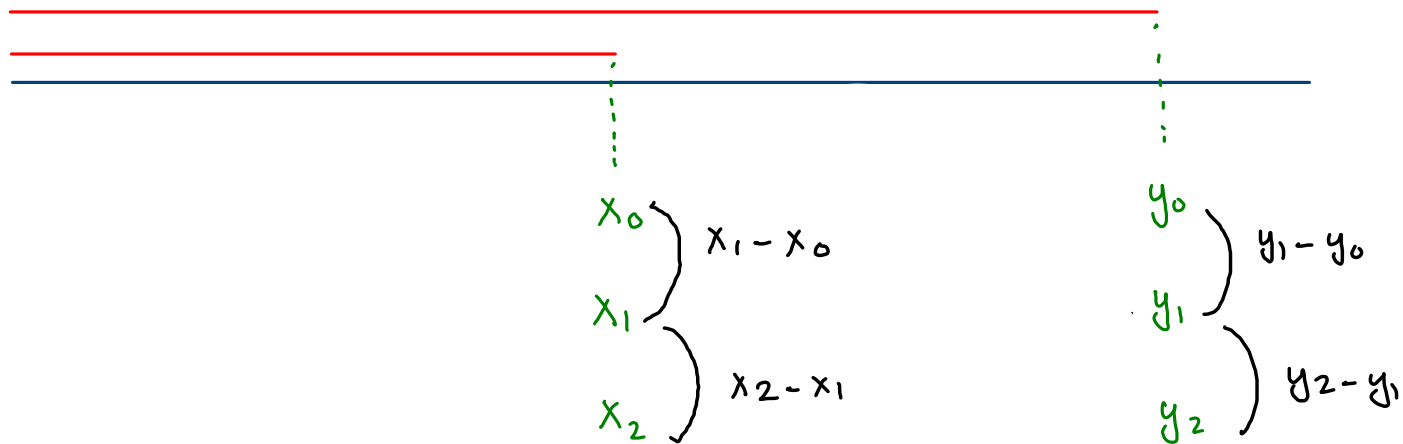
count  $\rightarrow 1 + 1 + 2 + 3 + 2$

0  $\rightarrow 3$   
1  $\rightarrow 4$   
2  $\rightarrow 2$

# Longest Subarray With Equal Number Of 0s 1s And 2s

$T : O(n)$

	<u>1</u>	0	0	<u>1</u>	0	2	<u>1</u>	2	<u>1</u>
	0	1	2	3	4	5	6	7	8
$C_0$	0	<u>1</u>	2	2	3	3	3	3	3
$C_1$	1	1	1	2	2	2	3	3	4
$C_2$	0	0	0	0	0	1	<u>1</u>	2	2



key :  $(c_1 - c_0) @ (c_2 - c_1)$

$$\text{Glen} = \frac{3}{6}$$

		$\begin{matrix} 1 \\ 0 \\ 0 \end{matrix}$	$\begin{matrix} 0 \\ 1 \\ 0 \end{matrix}$	$\begin{matrix} 0 \\ 1 \\ 0 \end{matrix}$	$\begin{matrix} 1 \\ 1 \\ 0 \end{matrix}$	$\begin{matrix} 2 \\ 1 \\ 0 \end{matrix}$	$\begin{matrix} 1 \\ 2 \\ 2 \end{matrix}$	$\begin{matrix} 1 \\ 1 \\ 0 \end{matrix}$	$\begin{matrix} 2 \\ 2 \\ 0 \end{matrix}$	$\begin{matrix} 1 \\ 1 \\ 0 \end{matrix}$
$-1$	$0$	$1$	$0$	$0$	$1$	$0$	$1$	$0$	$1$	$0$
$C_0$	$0$	$0$	$1$	$2$	$2$	$3$	$3$	$3$	$3$	$3$
$C_1$	$0$	$1$	$1$	$1$	$2$	$2$	$2$	$3$	$3$	$4$
$C_2$	$0$	$0$	$0$	$0$	$0$	$0$	$1$	$1$	$2$	$2$
keys	$1 @ -1$	$0 @ -1$	$-1 @ -1$	$0 @ -2$	$-1 @ -2$	$-1 @ -1$	$0 @ -2$	$0 @ -1$	$1 @ -2$	$1 @ -2$

$[(C_1 - C_0) @ (C_2 - C_1)]$  vs first occ

$$0 @ 0 \rightarrow -1$$

$$1 @ -1 \rightarrow 0$$

$$0 @ -1 \rightarrow 1$$

$$-1 @ -1 \rightarrow 2$$

$$0 @ -2 \rightarrow 3$$

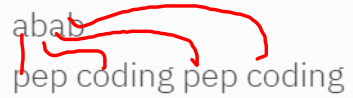
$$-1 @ -2 \rightarrow 4$$

$$1 @ -2 \rightarrow 8$$

## Word Pattern

one on one mapping

abab  
pep coding pep coding



a → pep

b → coding

a      b      c      a      d  
pep   coding   tea   pep   tea

false

hashmap < Ch, String > map ;

a - pep

b - coding

c - tea

pep  
coding  
tea

used

↙  
hashset

```
for(int i=0; i < pattern.length();i++) {  
    char ch = pattern.charAt(i);  
    String word = arr[i];  
  
    if(map.containsKey(ch) == false) {  
        if(used.contains(word) == true) {  
            return false;  
        }  
        map.put(ch,word);  
        used.add(word);  
    }  
    else {  
        String pmword = map.get(ch); //previously mapped word  
  
        if(pmword.equals(word) == false) {  
            return false;  
        }  
    }  
}
```

a	b	c	d
pep	coding	dev	pcp

a -> pep

b -> coding

c -> dev

pcp  
coding  
dev

used



1502. Can Make Arithmetic Progression From Sequence

2      8      6      4  
min                      5min  
✓      ✓      ✓      ✓

2, 8  
6, 4

2, 4, 6, 8

$cd = 2$

## 781. Rabbits in Forest

Medium

👍 566

💬 448

♡ Add to List

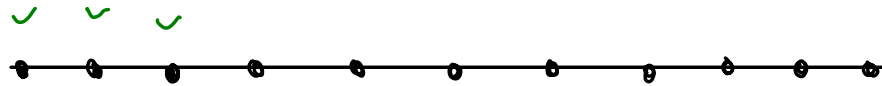
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There is a forest with an unknown number of rabbits. We asked  $n$  rabbits "How many rabbits have the same color as you?" and collected the answers in an integer array `answers` where `answers[i]` is the answer of the  $i^{\text{th}}$  rabbit.

Given the array `answers`, return *the minimum number of rabbits that could be in the forest.*

10      10      10  
0          1          2

1          1          2  
0          1          2



Survey :

$2_0$     $2_1$     $2_2$     $2_3$     $2_4$     $2_5$     $2_6$     $3_7$     $3_8$   
 $3_9$     $3_{10}$     $3_{11}$     $5_{12}$     $5_{13}$     $5_{14}$     $4_{15}$     $7_{16}$     $7_{17}$     $5_{18}$     $7_{19}$

ans vs how many rabbits

$2 \rightarrow 7$     $gs$  ,    $tr$

$3 \rightarrow 5$

$5 \rightarrow 4$

$4 \rightarrow 1$

$7 \rightarrow 3$

$$C + z \left\lceil \frac{tr}{gs} \right\rceil * gs$$

ans : 36

