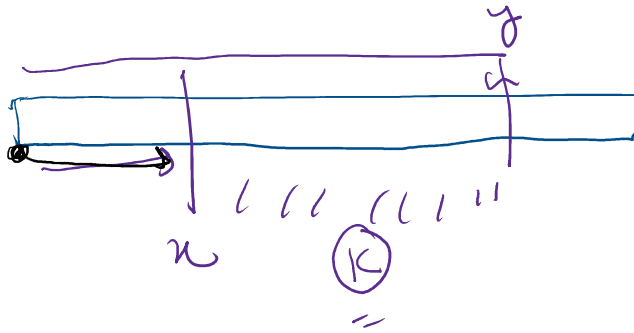


3.7 - Hashing - 3

Sunday, July 20, 2025 10:34 AM

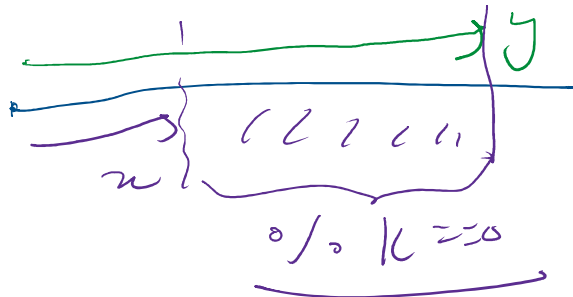
Subarray sum equals = k



$$y - n = k$$

$$n = y - k$$

Subarray sum divisible = by k

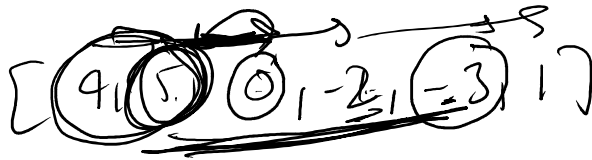


$$(y - n) \% k = 0$$

$$(y - n) \% k = (y \% k - n \% k + k) \% k$$

$$y \% k = n \% k$$

$$(y - n) \% k = 0$$



$PS[i-k]$	freq
0	1 ✓
4	1 2 3 4
5	1
2	1

$$\begin{aligned}
 k &= 5 & 1+2+3+1 \\
 PS &= 4+5 & \text{ans} = 1 \\
 q[1][5] &= 4 & + 23 \\
 q[4][5] &= 4
 \end{aligned}$$

④ Questions based on subarray sums are solved using Hash maps.



$$\begin{aligned}
 (j-u) \cdot 1 \cdot k &= 20 \\
 \textcircled{j-1 \cdot k} &= \underline{\underline{n \cdot 1 \cdot k}}
 \end{aligned}$$

$$(j \cdot 1 \cdot k - n \cdot 1 \cdot k + k) \cdot 1 \cdot k = 0$$

$$\textcircled{j \cdot 1 \cdot k} - n \cdot 1 \cdot k + k \cdot 1 \cdot k = 0$$

$$j \cdot 1 \cdot k = n \cdot 1 \cdot k \quad j = 105 \cdot 1 \cdot 5$$

$$z = 1 + i \quad z = 1 + i$$

$$(z = 1 + i) \cdot 1 + i \Rightarrow (1 + i - 1 + i + 1) \cdot 1 + i$$

$$= 1 + i$$

$$(1 + i + 1) \cdot 1 + i = 2 + i$$

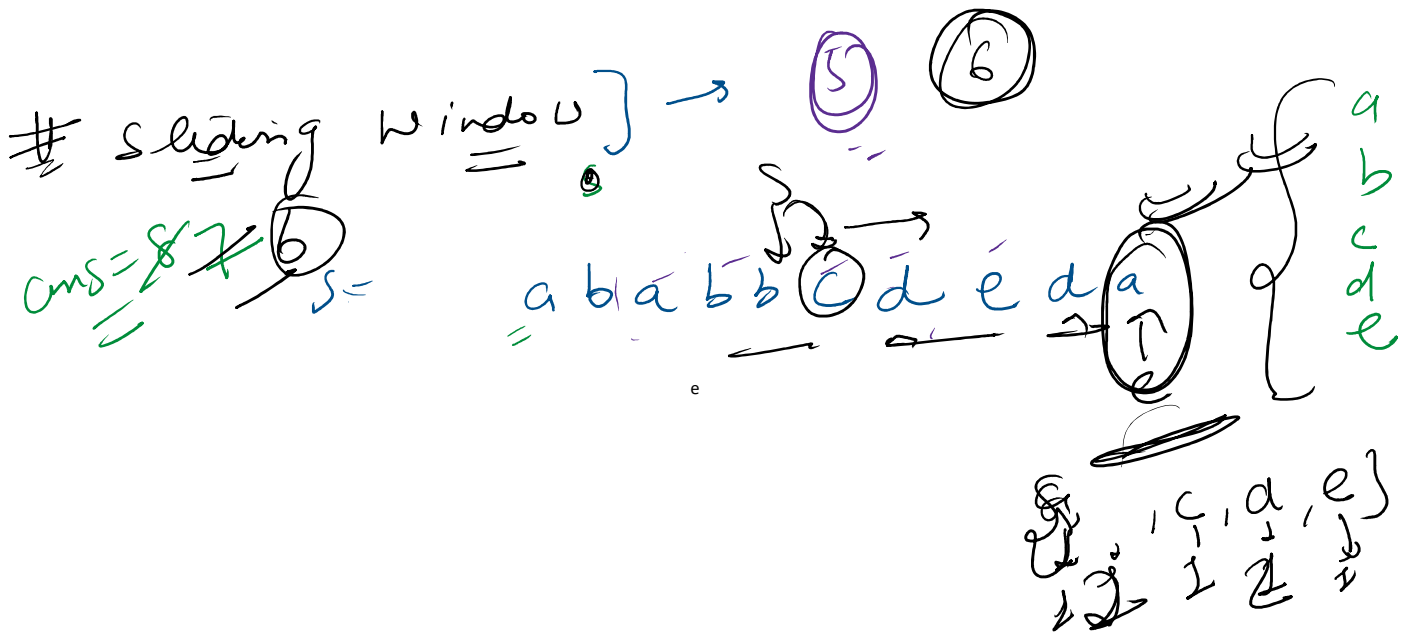
$$(a + b)^2 = a^2 + b^2 + 2ab$$

$$(x - y) \cdot 1 + i =$$

$$(x \cdot 1 + i - y \cdot 1 + i + 1) \cdot 1 + i = 0$$

$$(x \cdot 1 + i) \cdot 1 + i - (y \cdot 1 + i) \cdot 1 + i + 1 \cdot 1 + i = 0$$

$$(x \cdot 1 + i - y \cdot 1 + i + 0) \cdot 1 + i = y \cdot 1 + i$$



general Algo

start with window of size 1

$s = 0, e = 0$

loop till entire array is not traversed.

\rightarrow Expand the window till you don't get a valid answer $e++$

\rightarrow Now shrink the window till it is valid

Minimum Window substring

ans = 6 ~~34~~

$s =$ A D O B E L O D E B A N C

$t =$ A B C



A	1	
B	1	
C	1	
D	1	
E	1	
L	1	
O	1	
B	1	
N	1	
C	1	

9 10

$S =$ A S O B E C O D E S A N C
 $t =$ A B C

$ans = 6$
 4

$C = 3$