

Count no. of sub-array with  $xor = m$  in a array of size  $n$  where  $1 \leq n \leq 10^6$

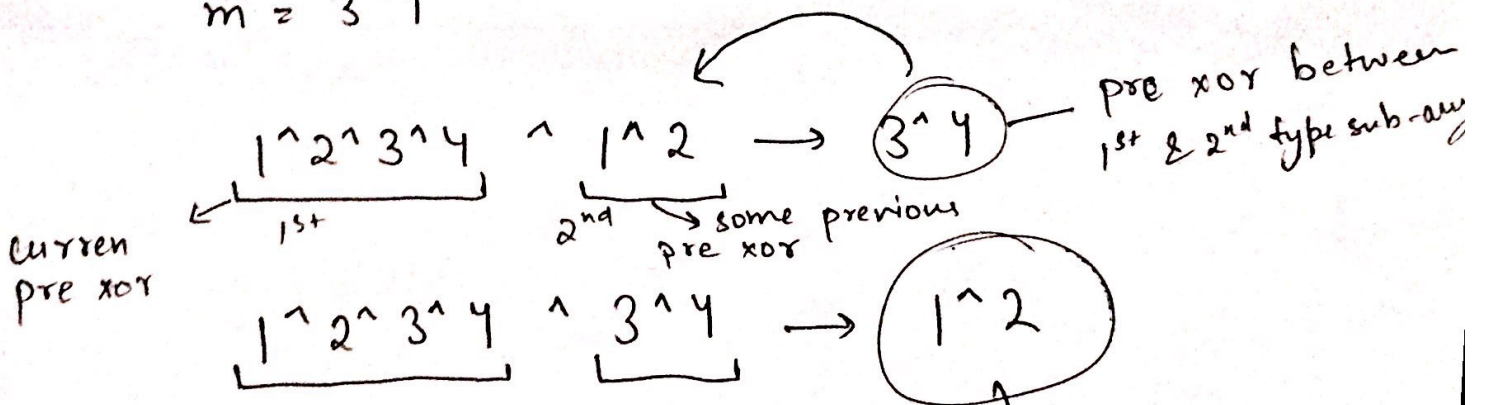
$A \rightarrow 1 \ 2 \ 3 \ 4 \ 5 \ 6$

If we do  $\underbrace{1^2^3^4}_{1st} \wedge \underbrace{1^2}_{2nd} \rightarrow 3^4$

Same as pre sum technique  $pre[i] - pre[j] = pre[i] - pre[j]$

But how to find if a sub-array has  $m$  xor-sum?

$$m = 3^4$$



If we have encountered any pre xor with this value that mean a subarray exists with  $xor = m$ .

$$a_i = 3$$

$$a_j = 4$$

$$a_i = 3$$

$$a_j = 3$$

$$a_i = 011$$

$$a_j = 100$$

$$a_i = 011 \oplus 011 = 011$$

$$a_j = 011 \oplus 011 = 011$$

No change

$$a_i = 011 \oplus 100 = 000$$

$$a_j = 011 \oplus 100 = 111$$

→ 1 bit is transferred

So if  $a_i$  &  $a_j$  are different then there always be a increase of set bit in one number and other will be reduced.

Goal/Aim

increase  $a_i^2$

$$1^2 = 1$$

$$2^2 = 4$$

$$3^2 = 9$$

$$4^2 = 16$$

$$5^2 = 25$$

So we will be profited by making all  $a_i$  as big as possible

eg

1	3	5
001	011	101

$$1^2 + 1^2 + 7^2 = 51$$

1	1	3
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$$\rightarrow 111$$

0	0	2
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$$\rightarrow 001$$

0	0	1
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$$\rightarrow 001$$

3

## Different base

or equal to

Represent ~~can~~ find an integer greater  $n_a$  in that can be terms of 3's different power

eg  $9 = 3^2$  ✓

$2 = 3^0 + 3^0$  X some power

$12 = 3^1 + 3^2$  ✓

ternary representation  
work same as binary

81	27	9	3	1	
<del>4</del>	<del>3</del>	2	1	0	
0	1	0	0	1	— n

$$n = 3^0 \times 1 + 3^1 \times 0 + 3^2 \times 0 + 3^3 \times 1 +$$

$$= 3 + 27 = 30$$

When will the number have some power of 3

↓ → observe

81	27	9	3	1	
0	0	0	(2)	1	— n
<hr/>					
1	+	2.3	=	7	

→ It will  
Cause problem

As base is  
3 it can  
have value

0, 1, 2

81	27	9	3	1	
0	0	0	2	1	— n
0	0	1	0	0	— n'

$$n = 7$$

$$n' = 9$$

n' will always be greater than n

$$\text{if } n = 022 = 8 < n'$$

So to remove the problem we set the first 0 encountered after a bit's value 2