Q1. Find a single number

Solution ① Properties of XOR.

$X \wedge X = 0$

$X \wedge 0 = X$

commutative and associative

the order doesn't matter

② Approach.

Since every number except one appears exactly twice

If we XOR all all the number together

the result will be the unique number

This is because all the pairs will cancel each other out to zero

leaving only the unique number

Example

cards=[0 1 0 1 2]

Solution

① 0^1^0^1^2

② 1^0^1^2

③ 1^1^2

④ 0^2

⑤ 2

⑥ So the number 2 is the unique number

Time Complexity : O(n)

Space complexity: O(1)

Code Implementation

① define unique

② for loop to $\wedge =$

③ return