

LeetCode

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Solution

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Solution

Approach 1: Brute Force

Intuition

We can try every possible x .

Algorithm

Since we divide the deck of n cards into say, x piles of x cards each, we must have $n \div x \equiv 0$.

Then, say the deck has c_i copies of cards with number i . Each group with number i has x copies, so we must have $c_i \div x \equiv 0$. These are necessary and sufficient conditions.

Java

Python

Copy

```
1 class Solution(object):
2     def hasGroupsWithX(self, deck):
3         count = collections.Counter(deck)
4         x = len(deck)
5         for x in range(2, x+1):
6             if x % x == 0:
7                 if all(v % x == 0 for v in count.values()):
8                     return True
9         return False
```

Complexity Analysis

- Time Complexity: $O(N^2 \log \log N)$, where N is the number of cards. It is outside the scope of this article to prove that the number of divisors of N is bounded by $O(N \log \log N)$.
- Space Complexity: $O(N)$.

Approach 2: Greatest Common Divisor

Intuition and Algorithm

Again, say there are c_i cards of number i . These must be broken down into piles of x cards each, i.e. $c_i \div x \equiv 0$ for all i .

Thus, x must divide the greatest common divisor of c_i . If this greatest common divisor g is greater than 1, then $x = g$ will satisfy. Otherwise, it won't.

Java

Python

Copy

```
1 class Solution(object):
2     def hasGroupsWithX(self, deck):
3         from fractions import gcd
4         vals = collections.Counter(deck).values()
5         return reduce(gcd, vals) > 1
```

Complexity Analysis

- Time Complexity: $O(N \log^2 N)$, where N is the number of votes. If there are C_i cards with number i , then each gcd operation is naively $O(\log^2 C_i)$. Better bounds exist, but are outside the scope of this article to develop.
- Space Complexity: $O(N)$.

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Post

youssufyassin 130 July 16, 2020 10:10 PM

Problems

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Run Code

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Python3

Autocomplex

1 class Solution(object):
2 def hasGroupsWithX(self, deck):
3 vals = collections.Counter(deck).values()
4 return reduce(gcd, vals) > 1

Console

Contribute