**Complexity and greedy**

**What’s complexity?**

There are two different types of complexity, time and space complexity.

Time complexity in competitive programing contest is: what’s the running time in the worst case scenario.

Space complexity in competitive programing contest is: what’s the space in the worst case scenario.

Scientist found a way to calculate time complexity and represent it as how many operations your program will take.

These days, personal computers CPU can do up to operation per second and super computers CPU can do up to operation per second.

Example:

I’ll give you an integer **N**that representsthe number of students (1 ≤ N ≤ )

And the time limit of this question is 1 second, and the space limit is 265 megabytes.

If you iterate over the input by using loops that will take operation and that’s fine.

And if you store them inside array, that will take space if the array had integer data type and for each element has 4 byte if you do some math byte if you convert it to megabyte that will be equal 0.4 megabytes and that’s fine.

But if that input up to you can’t iterate over all input by using loops because that will take operation ,the program will take more than one second to handle this input, you have to find smarter solution, maybe by using binary search algorithm that has a time complexity O(log(n)).

The main reason of competitive programing is to design algorithm find solutions using as few time and space as possible in the shortest time.

**What’s greedy?**

constructs a solution to the problem by always making a choice that looks the best at the moment.

Example: <https://codeforces.com/contest/996/problem/A> read this problem

Answer:

if the input was 25,

the coins are {100,20,10,5,1}.

The best choice at the first moment is to choose 20 and the remaining is 5

the best choice at the second moment is to choose 5 and the remaining is 0

the answer is 2 -> {20,5}.

This technique called greedy if we choose best choice at this moment, we don’t need to go back to edit our solution.

\*video below we discuss complexity and greedy.

<https://youtu.be/RxMQq1B4Vt4>

We solved these problems:

<https://codeforces.com/contest/996/problem/A>

<https://codeforces.com/contest/58/problem/A>

try to solve these problems:

<https://codeforces.com/problemset/problem/1385/B>

<https://codeforces.com/problemset/problem/978/B>

<https://codeforces.com/problemset/problem/1197/B>

<https://codeforces.com/problemset/problem/158/B>

<https://codeforces.com/problemset/problem/1324/C>