

# Guidelines of the Online Judge System

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(Some of the screenshots are for a previous course, but the links are all up to date.)

## 0. Register Your Account in CodeForces

Access the CodeForces website with URL <https://codeforces.com/enter>.

If you already have a CodeForces account, log in directly. If not, Click “Register” to register an account, then log in.



**Fill in the form to login into Codeforces.**  
You can use [Gmail](#), [Facebook](#) or [ICPC](#) as an alternative way to enter.

**Login into Codeforces**

Handle/Email

Password

☐ Remember me for a month

Login

[Forgot your password?](#)

[Use Gmail](#) | [Use Facebook](#) | [Use ICPC](#)

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The only programming contests Web 2.0 platform  
Server time: Sep/28/2020 02:05:22<sup>UTC-7</sup> (h1).  
Desktop version, switch to [mobile version](#).  
[Privacy Policy](#)

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# 1. Join the Group as a Participant

After login, click here to join our group: <https://codeforces.com/group/imtYsVNAKN/contests>

**Remember to choose “Participant” as Membership type.** (The default option is “Spectator”, which will not allow you to submit your code.) Then click **“Join”**.

**CS141-F24**

**Private**

Spectator

★

→ **Member management**

You are not group member yet,  
but can request group join.

Membership type: Participant ▼

Join

Then you can see the home page of our group, each programming assignment will be released at the corresponding start time. Usually, this is the time that the corresponding assignment is released.

The rest of the screenshots were taken from other courses/contests as examples. All the steps should be exactly the same.

CONTESTS MEMBERS STATUS

Name	Start	Length	Before start	Prepared by
CS141 Assignment #1	<a href="#">Sep/29/2020 00:00 UTC-7</a>		23:44:55	ayhtalala

Before registration 17:44:55  
\* Highlighted contests are not public

**CS141**

Private

Participant



→ **Member management**

You are the member of the group

Leave

Each programming assignment will be released at the corresponding start time

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Once it's released, the page will look like this:

CONTESTS MEMBERS STATUS

Name	Start	Length	Current standings	Prepared by
CS141 Assignment #1 <a href="#">Enter »</a>	<a href="#">Sep/28/2020 00:00 UTC-7</a>		Running 4 weeks	ayhtalala

Until closing 4 weeks  
\* Highlighted contests are not public

**CS141**

Private

Participant



→ **Member management**

You are the member of the group

Leave

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The only programming contests Web 2.0 platform  
Server time: Sep/28/2020 00:30:45 UTC-7 (f3).  
Desktop version, switch to [mobile version](#).  
[Privacy Policy](#)

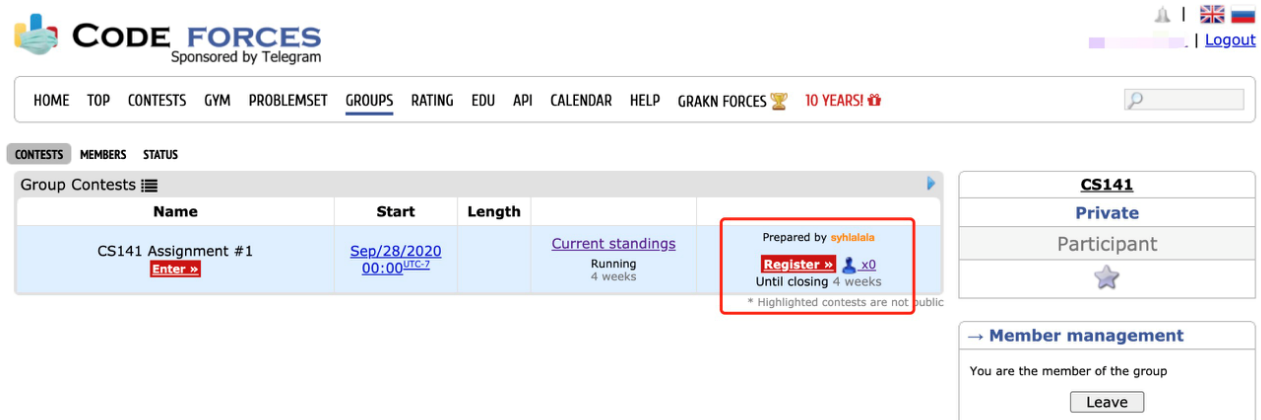
Supported by



## 2. Registration for the Contests

After it's released, you can see the page above.

**Click “Register” to register for the contest. You should be registered for the contest to be able to submit.**



CODE FORCES  
Sponsored by Telegram

HOME TOP CONTESTS GYM PROBLEMSET **GROUPS** RATING EDU API CALENDAR HELP GRAKN FORCES 10 YEARS!

CONTESTS MEMBERS STATUS

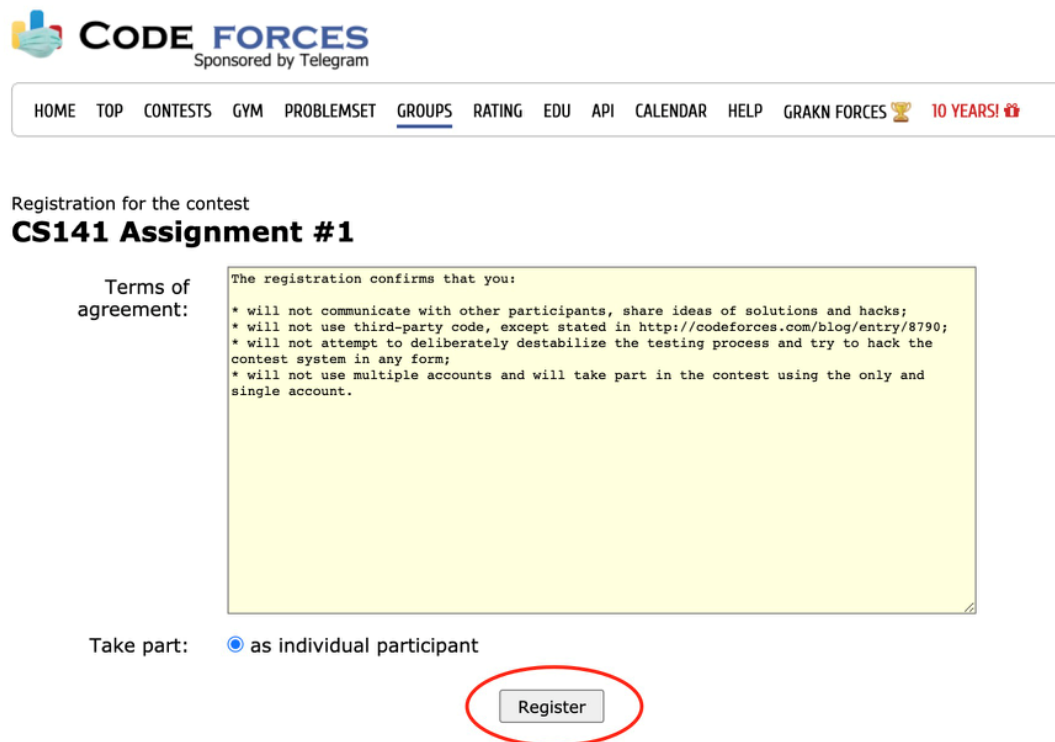
Group Contests

Name	Start	Length	
CS141 Assignment #1 <a href="#">Enter »</a>	Sep/28/2020 00:00 UTC-7		<a href="#">Current standings</a> Running 4 weeks <a href="#">Register »</a> x0 Until closing 4 weeks <small>* Highlighted contests are not public</small>

**CS141**  
**Private**  
Participant  
★

→ **Member management**  
You are the member of the group  
[Leave](#)

Continue clicking “Register”, then you will receive a message that “You have been successfully registered”.



CODE FORCES  
Sponsored by Telegram

HOME TOP CONTESTS GYM PROBLEMSET **GROUPS** RATING EDU API CALENDAR HELP GRAKN FORCES 10 YEARS!

Registration for the contest  
**CS141 Assignment #1**

Terms of agreement:

The registration confirms that you:

- \* will not communicate with other participants, share ideas of solutions and hacks;
- \* will not use third-party code, except stated in <http://codeforces.com/blog/entry/8790>;
- \* will not attempt to deliberately destabilize the testing process and try to hack the contest system in any form;
- \* will not use multiple accounts and will take part in the contest using the only and single account.

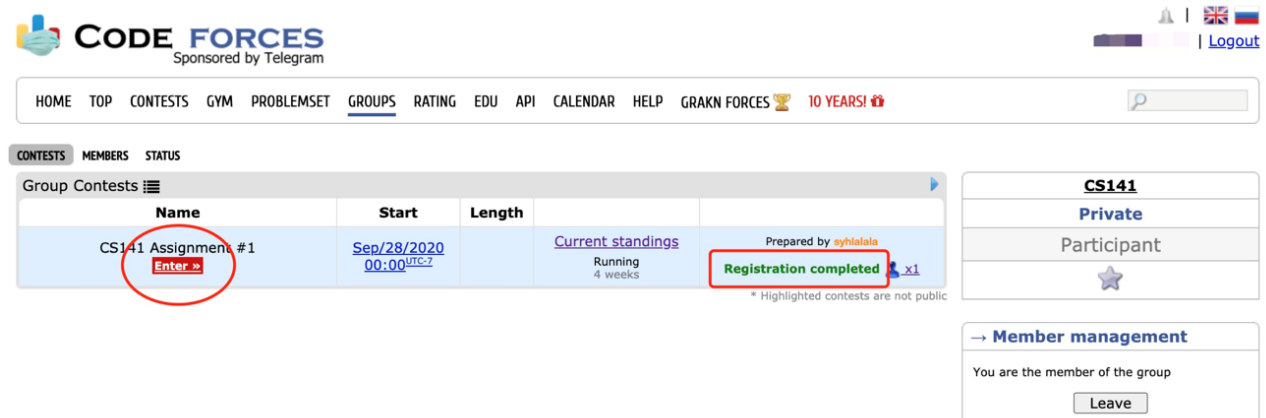
Take part: ☒ as individual participant

[Register](#)

### 3. Start Programming

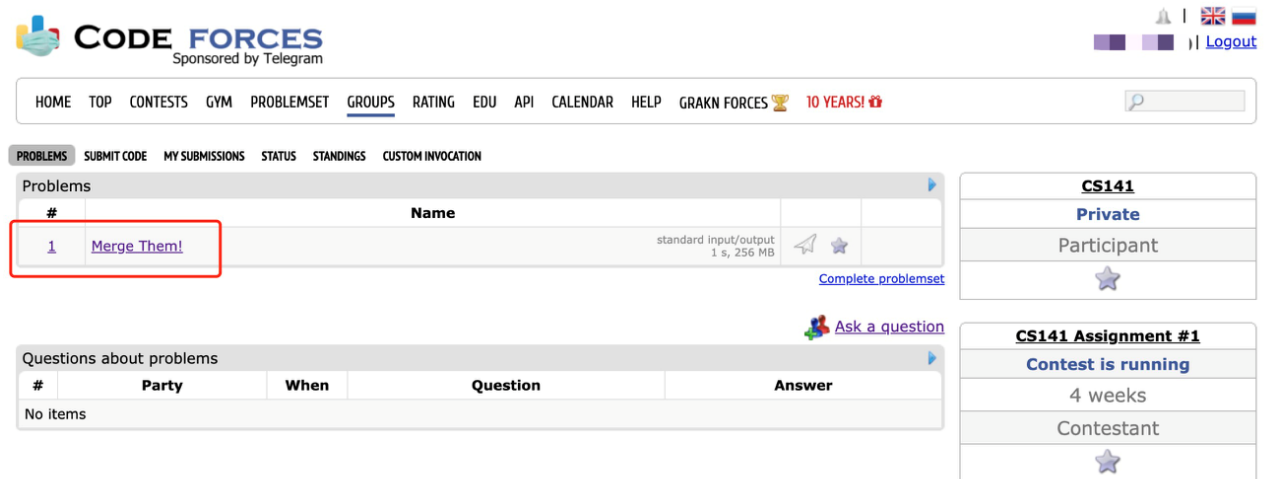
Before starting programming, make sure you can see "Registration Completed" displayed here, which means you have successfully registered. If not, try to repeat the registration step.

Then, **click "Enter"**.



The screenshot shows the Codeforces website interface. The top navigation bar includes links for HOME, TOP, CONTESTS, GYM, PROBLEMSET, GROUPS (selected), RATING, EDU, API, CALENDAR, HELP, and GRAKNI FORCES. The main content area displays a table of groups. The first group, 'CS141 Assignment #1', is highlighted. The 'Enter' button is circled in red. The 'Registration completed' status is also highlighted in red. The right sidebar shows the group details for 'CS141', including 'Private' status, 'Participant' role, and a 'Leave' button.

You will see the programming problems for this assignment.



The screenshot shows the Codeforces website interface. The top navigation bar includes links for HOME, TOP, CONTESTS, GYM, PROBLEMSET, GROUPS (selected), RATING, EDU, API, CALENDAR, HELP, and GRAKNI FORCES. The main content area displays a table of problems. The first problem, 'Merge Them!', is highlighted with a red box. The 'Registration completed' status is also highlighted in red. The right sidebar shows the group details for 'CS141', including 'Private' status, 'Participant' role, and a 'Leave' button.

Click on the name to enter. Then you can see the whole problem.

## 1. Merge Them!

time limit per test: 1 second  
memory limit per test: 256 megabytes  
input: standard input  
output: standard output

It's not easy to be a teacher - because you need to make all students happy. Yihan is asked to order a list of students by their exam score (from lowest to highest). Now all the students stand in a row in front of her. She has learned the merge sort algorithm, so that's exactly how she plans to do: she will divide the students into the left half and the right half, sort each of them respectively, and then merge them into a sorted row.

The core part in merge sort is to merge two sorted arrays (subset of students) into one. However, students are incoordinated because some of them are unhappy to be sorted. Generally, anytime two subsets of students  $A$  and  $B$  are merged, the student with the lowest score in  $A \cup B$ , let's call the student  $X$ , will be very unhappy because now everyone knows that he or she didn't do well in the exam. Yihan has to give  $X$  some candies to make  $X$  happy again. In particular, the number of candies  $X$  needs is the difference between  $X$ 's score and the highest score in the merged result  $A \cup B$ . If there are multiple such students (i.e., with the same lowest score), they all need the same number of candies.

Yihan knows the initial order of the students and their scores. She wants to know how many candies she needs to prepare to finish the task of merge-sorting all the students's score, while keeping everyone happy.

### Input

The first line is a single integer  $n$  ( $1 \leq n \leq 10^6$ ). Assume  $n$  is a power of 2 so that in merge sort we can always divide it into exactly halves.

In each of the next  $n$  lines, there is an integer that is the score  $s_i$  of the  $i$ -th student  $0 < s_i \leq 2^{31}$ .

### Output

The first line contains the number of candies that Yihan has to prepare.

The next  $n$  lines each contains a positive integer, which is the sorted result of the input scores.

The output value is guaranteed to be within  $2^{31} - 1$ .

**CS141**  
**Private**  
Participant  
★

**CS141 Assignment #1**  
**Contest is running**  
4 weeks  
Contestant  
★

→ **Submit?**

Language: GNU G++17 7.3.0

Choose file: Choose File No file chosen

Submit

To submit your code, **click “Submit Code”**. **Don't forget to choose your language.**

## Submit solution CS141 Assignment #1

Problem: 1 - Merge Them!  
standard input/output 1 s, 256 MB  
Language: GNU G++17 7.3.0

Choose your language

Source code:

Switch off editor

Tab size: 4

Or choose file: Choose File No file chosen

Submit

After finishing your code, click the **“Submit”** button to submit your answer.

Then you can see whether your answer is correct. If all test cases are passed, it will be judged as **“Perfect result – x points”** (x is the total number of points of that problem). If not, means you failed in some test cases, and it will show your score based on the number of tests you passed.

PROBLEMS SUBMIT CODE MY SUBMISSIONS STATUS STANDINGS ADM. EDIT CUSTOM INVOCATION

My Submissions					
#	When	Who	Problem	Lang	Verdict
<a href="#">130314428</a>	Sep/29/2021 20:44 <sup>UTC-7</sup>	syhlalala	<a href="#">E - Feeding Friendsy</a>	GNU C++17	<a href="#">Perfect result: 80 points</a>
<a href="#">130314158</a>	Sep/29/2021 20:38 <sup>UTC-7</sup>	syhlalala	<a href="#">E - Feeding Friendsy</a>	GNU C++17	<a href="#">Perfect result: 80 points</a>
<a href="#">130313967</a>	Sep/29/2021 20:33 <sup>UTC-7</sup>	syhlalala	<a href="#">E - Feeding Friendsy</a>	GNU C++17	<a href="#">Partial result: 75 points</a>
<a href="#">129912417</a>	Sep/26/2021 02:40 <sup>UTC-7</sup>	syhlalala	<a href="#">I - Sphere Mongers</a>	GNU C++17	<a href="#">Partial result: 96 points</a>
<a href="#">129911661</a>	Sep/26/2021 02:29 <sup>UTC-7</sup>	syhlalala	<a href="#">I - Sphere Mongers</a>	GNU C++17	<a href="#">Partial result: 96 points</a>
<a href="#">129911303</a>	Sep/26/2021 02:24 <sup>UTC-7</sup>	syhlalala	<a href="#">I - Sphere Mongers</a>	GNU C++17	<a href="#">Partial result: 18 points</a>

You can submit an arbitrary number of times before the deadline. The highest score for each problem will be counted. If you want to re-submit after debugging, you could just go back to the “Submit Code” page and submit your new version.

Note that you have to pass the first test case (which is usually just the example) to get any points. Otherwise you will see something like:

<a href="#">129737615</a>	Sep/24/2021 00:54 <sup>UTC-7</sup>	syhlalala	<a href="#">H - Fetch Quest</a>	GNU C++17	<a href="#">Wrong answer on test 1</a>
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This is, however, a feature of the system. So just make sure you at least pass the example.

If you want to know more about your results, click the “verdict” column for each problem in the table above. You will see a list of your results for each test case. For example:

Judgement protocol	
#1:	Accepted [0 ms, 0 MB, 10 points]
#2:	Accepted [0 ms, 0 MB, 10 points]
#3:	Accepted [0 ms, 0 MB, 10 points]
#4:	Accepted [1684 ms, 0 MB, 10 points]
#5:	Accepted [31 ms, 3 MB, 10 points]
#6:	Accepted [15 ms, 0 MB, 10 points]
#7:	Accepted [15 ms, 3 MB, 10 points]
#8:	Time limit exceeded [5000 ms, 3 MB, 0 points]
#9:	Time limit exceeded [5000 ms, 0 MB, 0 points]
#10:	Time limit exceeded [5000 ms, 3 MB, 0 points]
#11:	Accepted [1512 ms, 3 MB, 10 points]
#12:	Time limit exceeded [5000 ms, 3 MB, 0 points]
#13:	Accepted [0 ms, 0 MB, 10 points]
#14:	Time limit exceeded [5000 ms, 3 MB, 0 points]
#15:	Time limit exceeded [5000 ms, 3 MB, 0 points]

This helps you understand the problems in your code.

With some of the core operations and functions covered above, you can try clicking on other buttons to explore other features that have not been introduced!

## 4. Other Notes

- **You won't be able to see the test data.** This is also the situation when you are in an interview, or, when you are actually at work in a company. One important skill as a programmer is to design test cases to find bugs in your own code. You need to consider a lot of corner cases to make sure your code is correct and robust.
- Each problem has 10-20 test cases, each with some points, based on the problem. This means that even your algorithm cannot solve the entire problem, if you can solve part of the problem (e.g., only for small inputs or simple inputs), you can get some points. Don't give up!
- For all the problems, we guarantee that a reasonable algorithm implemented in C++ will pass all test cases within the time limit. **Other languages are allowed, but not guaranteed to always satisfy time limit.** We will use time scaling policy to help accommodate this: The system automatically adjusts time limits by the following multipliers for some languages. You can see more details [here](#). However, still, C++ is highly recommended because it is the most efficient in running time.
- Sometimes the input time may be long and it can dominate your running time. To simply make your input time faster, here are some useful material C+, Java and Python (again, even so, it's not guaranteed that python can always pass the largest test case):
  - o C++: <https://www.geeksforgeeks.org/fast-io-for-competitive-programming/>
  - o Java: <https://www.geeksforgeeks.org/fast-io-in-java-in-competitive-programming/>
  - o Python: <https://www.geeksforgeeks.org/python-input-methods-competitive-programming/>

## Happy Coding!