

Guidance of the Online Judge System

This document is originally for CS 141 (F20). In all figures, if you see 141, please replace it by 142.

0. Register your account

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

[Forgot your password?](#)

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

Codeforces (c) Copyright 2010-2020 Mike Mirzayanov
The only programming contests Web 2.0 platform
Server time: Sep/28/2020 02:05:22^{UTC-7} (h1).
Desktop version, switch to [mobile version](#).
[Privacy Policy](#)

Supported by



1. Join Our Group as a Participant

After login, click here to join our group: <https://codeforces.com/group/AinsJkOCvs/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”**.

The screenshot shows the Codeforces website interface for joining a group. At the top, there is a navigation bar with links like HOME, TOP, CONTESTS, GYM, PROBLEMSSET, GROUPS, RATING, EDU, API, CALENDAR, HELP, GRAKN FORCES, and 10 YEARS!. The main content area is titled "Join group" and displays the following information:

- Group name: **cs141**
- Group description:
- Group visibility: Private
- Membership type: **Participant** (highlighted with a red circle and an arrow pointing to it from a red text annotation: "Remember to choose 'Participant' (Default is 'Spectator')")

Below the membership type dropdown is a "Join" button. To the right, there is a "Member management" section with a "Join" button. The footer contains copyright information for Codeforces (c) Copyright 2010-2020 Mike Mirzayanov, the server time (Sep/27/2020 23:48:11 UTC-7 (f3)), and a link to the Privacy Policy. It also mentions support by ITMO UNIVERSITY.

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.

CONTESTS MEMBERS STATUS

Name	Start	Length	
CS141 Assignment #1	Sep/29/2020 00:00^{UTC-7}	Before start 23:44:55	Prepared by syhlalala Before registration 17:44:55 <small>* Highlighted contests are not public</small>

CS141

Private

Participant

★

→ **Member management**

You are the member of the group

Each programming assignment will be released at the corresponding start time

Supported by



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

CONTESTS MEMBERS STATUS

Name	Start	Length	
CS141 Assignment #1 <input type="button" value="Enter »"/>	Sep/28/2020 00:00^{UTC-7}		Current standings Running 4 weeks Prepared by syhlalala <input type="button" value="Register »"/> x0 Until closing 4 weeks <small>* Highlighted contests are not public</small>

CS141

Private

Participant

★

→ **Member management**

You are the member of the group

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.

The screenshot shows the Codeforces website interface. At the top, there's the Codeforces logo and navigation links. Below that, a table lists group contests. The first row is for 'CS141 Assignment #1', which is highlighted in blue. A red box highlights the 'Register' button and the 'x0' participants count. To the right of the table, there's a sidebar with 'CS141' details, including 'Private' status and a 'Participant' button. Below that, there's a 'Member management' section with a 'Leave' button.

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

The screenshot shows the Codeforces website interface. At the top, there's the Codeforces logo and navigation links. Below that, there's a section for 'Registration for the contest' with the title 'CS141 Assignment #1'.

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. At the top, there is a navigation bar with links like HOME, TOP, CONTESTS, GYM, PROBLEMSSET, GROUPS, RATING, EDU, API, CALENDAR, HELP, GRAKN FORCES, and 10 YEARS!. Below this, there are tabs for CONTESTS, MEMBERS, and STATUS. The main content area displays a table of group contests. The first row is for 'CS141 Assignment #1', which is highlighted in blue. The 'Enter' button in this row is circled in red. To the right of the table, there is a sidebar with information about the contest: 'CS141', 'Private', 'Participant', and a star icon. Below this, there is a 'Member management' section with a 'Leave' button.

You will see the programming problems for this assignment.

The screenshot shows the Codeforces website interface, specifically the 'Problems' section for the 'CS141 Assignment #1' contest. The navigation bar is the same as in the previous screenshot. Below the navigation bar, there are tabs for PROBLEMS, SUBMIT CODE, MY SUBMISSIONS, STATUS, STANDINGS, and CUSTOM INVOCATION. The main content area displays a table of problems. The first row is for 'Merge Them!', which is highlighted with a red box. To the right of the table, there is a sidebar with information about the contest: 'CS141', 'Private', 'Participant', and a star icon. Below this, there is a 'Questions about problems' section with a table for questions and answers.

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 stands 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 incoordinate 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:

1

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 “**Accepted**”. If not, means you failed some test cases. You should go back to the “Submit Code” page, review your code, modify it, and resubmit it.

You won't be able to see the tests before the contest ends.



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

PROBLEMS SUBMIT CODE MY SUBMISSIONS STATUS STANDINGS CUSTOM INVOCATION

My Submissions

#	When	Who	Problem	Lang	Verdict	Time	Memory
94070335	01:18:52	██████████	1 - Merge Them!	Java 11	Wrong answer on test 2	171 ms	0 KB
94061848	01:08:08	██████	1 - Merge Them!	GNU C++17	Accepted	202 ms	500 KB

"Accepted" means your answer passed all test cases

"Wrong answer..." means you failed some of the test cases

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!

Happy Coding!