SWE2026 Problem Solving Techniques, 2021 Spring

Instructor: Younghoon Kim

PA 1: FC PST, Heavy Brick

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1. Submission Details

1- A. Scoring Criteria

- 90% for Programming, 10% for Report.
- Programming is directly scored by *goorm* platform.
- Report is P/F based.
  - If your report has less than 4 issues (over-volume, under-explanatory, etc.), grade **P** (Pass, full credit). Otherwise, **I** (Incomplete).
  - After you get **I**, you can submit once more. If it is okay, grade **1/2 P** (half Pass, half credit). Otherwise, **F** (Fail, no credit).

1- B. Deadline

- **One week** for regular submission, two days for delayed submission.
- Regular submission due for both program code (via *goorm*) and report (via *iCampus*) is **2021/03/14(Sunday) 23:59:00.**
- Delayed submission penalty is 25% per day, and submission will be closed on 2021/03/16(Tuesday) 23:59:00.
- Be careful: *goorm* **do <u>NOT</u> warn** for delayed submission and penalty is automatically applied, and the last one minute of the final day is considered as late.

1- C. About Report

- Either **Korean or English** is acceptable.
- **Should keep the line limits**. Make your answers clearer by shortening them.
- **Do <u>NOT</u> handwrite** your answers. Only figures can be hand-drawn in empty spaces.
- **HANDWRITE** the signature of honor code. Writing via pen (on tablet PC) is okay.

2. Problem 1 - FC PST

2- A. Problem Description

FC PST is an amateur football club. Mr. Kang, the manager of this team, writes the date(month and day) of that day, GF(Goal For, earned score) and GA(Goal Against, lost score) in the random page of his notebook every time a match ends. For example, if FC PST beats FC ALGO 3-2 on March 8th, he records the result as '3 8 3 2'.

While manager Kang was examining FC PST's match results of last year, he suddenly wondered *when the absolute value of ASGD(Accumulated Sum of Goal Difference) became largest* and *what exactly the ASGD was at that time*.

You should make a program that helps Kang calculate the earliest date on which an absolute value of ASGD reached its highest point and its value at that moment from his own notes.

Assume that all of his notes that count in this situation are those of last year.

2- B. Restriction

In the first line, the number of notes(or match results) that Kang wrote in his book, N is given.

For next N lines, the details(Month_i, Day_i, GF_i, GA_i) of each note are separately given one space by one space.

Print **the earliest Month and Day** when the absolute value of ASGD (Accumulated Sum of Goal Difference) is the largest and the ASGD at that time, separated by one space.

When it comes to the printing ASGD, the positive sign(+) must be dropped and the negative sign(-) must be written. 0 is considered as positive and should be written as 0.

Details

- For 70% of test cases, N <= 10,000
- For the rest 30% of test cases, N <= 500,000
- For all test cases, Month_i, Day_i is valid value on common year (you don't need to consider leap year)
- For all test cases, 0 <= GF_i, GA_i <= 3,000

2- C. Example

Input	Output
2 8 14 2 0 3 8 3 2	8 14 3

Description

- From Jan 1st(1/1) to March 7th(3/7), the ASGD is 0 because not a match took place at all.
- From March 8th(3/8) to August 13th(8/13), the ASGD is +1.
- From August 14th(8/14) to Dec 31st(12/31), the ASGD is +3.

The answer is August 14th and ASGD of +3, thus you should print ‘8 14 3’.

3. Problem 2 - Heavy Brick

3- A. Problem Description

There are N bricks that are very heavy, and they are numbered from 1 to N without an order.

You want to make these stacked bricks arranged in order from number 1 to number N.

You can use a special machine to remove a brick from desired location, and then place the removed brick on the top, or you can lift the entire brick and place the removed brick at the bottom. (It is not possible to move several bricks at a time because you have only one machine.)

However, since it requires a significant amount of fuel to use this machine, you are also trying to minimize this 'remove-and-replace' process. Find the minimal number of trials to completely sort the stacked bricks in order from top.

3- B. Restriction

The first line of the input starts with the number of bricks **N**. For the next line, the numbers of bricks stacked from top to bottom were given as input values.

An expected output is the minimum number of actions to ensure that all bricks are sorted in ascending order from 1 to N from the top.

Details

- For 70% of test cases, 1 <= N <= 10 000
- For the rest 30% of test cases, 1 <= N <= 700 000
- For all test cases, there are no bricks that have the same number.
- For all test cases, 1 <= b[i] <= N (b[i] is ith brick's number.)
- For simplicity of implementation, inputs and outputs are written in template code, so you can write a solution(int, int*) function.

3- C. Example(s)

Input	Output
5 4 5 1 3 2	3
10 2 4 6 9 8 1 7 5 3 10	8

Description

- 5 in the first line of the first example means there are 5 bricks.(i.e. N = 5)
- Bricks can be sorted with the following process.
    - 4 5 1 3 2 (0)
    - 3 4 5 1 2 (1)
    - 2 3 4 5 1 (2)
    - 1 2 3 4 5 (3)
- So we can make bricks being sorted with only 3 movements.
- Second test case can be sorted in a similar way.