

2022 C++ Coding Workshop Mini Contest

INFORMATION

Date	18 April 2022
Time	14:10 - 16:50 (2 hours 40 minutes)
Full Score	100

PROBLEMS

Problem		Limit		Score	
		Time	Memory	Subtasks	Total
TC22A0	Gonna Give You Up	1s	256MB	5	5
TC22A1	Letter to the Editor	1s	256MB	7 + 3	10
TC22A2	Diskalmer	1s	256MB	10 + 7 + 3	20
TC22A3	Bob the Builder	1s	256MB	10 + 20	30
TC22A4	Two Stone One Bird	1s	256MB	5 + 5 + 5 + 5 + 10 + 5	35

REMINDERS

- All tasks are divided into subtasks, your program must pass all test cases in a subtask to get points.
- Unless otherwise specified, your output will be automatically fixed as follows:
 - Trailing spaces in each line will be removed.
 - An end-of-line character will be added to the end of the output if not present.
- 64-bit integers may be required in some problems, use `long long` in C++ if needed.

TC22A0 Gonna Give You Up

Score 5
Time Limit 1s
Memory Limit 256MB

Rick Astley is running for president!

Let's pretend Rick is an American, and you are also an American older than 18. Will you vote for Rick in the presidential election?

You are asked to write a program to predict what is the response of Rick if you vote for him or not.

INPUT

The input consists of 1 string, either YES or NO.

OUTPUT

When the input is YES, output Never Gonna Give You Up.

When the input is NO, output Forever Gonna Give You Up.

SAMPLE TESTS

	Input	Output
1	YES	Never Gonna Give You Up
2	NO	Forever Gonna Give You Up

HINT

Use if statement.

TC22A1 Letter to the Editor

Score 10
Time Limit 1s
Memory Limit 256MB

The quick brown fox jumps over the lazy dog.

A “Letter to the Editor” column is very important for the OI (Office International) Team, as they can collect customers' comments and think of ways to improve the team. However, after the column was set up, there was only one response. :(

The editor is angry and bored now. Reading the one and only letter received from a kind customer Kiki, he starts to count the words inside the letter. Now you are the editor of the OI Team, you are very bored, meanwhile want to write some C++ code. Therefore, you decide to write a program to count how many times a specific alphabet (a-z) appeared in the letter.

INPUT

The first line of input contains a lower-case English alphabet (a-z) M .

The following unknown number of lines are the contents of the letter, which may contain lower-case English letters, numbers, punctuation marks, symbols and spaces.

OUTPUT

Output an integer, the number of times the alphabet M appeared in the letter.

SAMPLE TESTS

	Input	Output
1	<pre>i dear editor, i am kiki. i think i was faked to join operation imaginary i.</pre> The alphabet i appears 12 times in the letter.	12
2	<pre>c aaabbbabbabbbababababb</pre> The alphabet c does not appear in the letter. (i.e. long time no c)	0

CONSTRAINTS

$1 \leq \text{Length of the letter} \leq 3500$

SUBTASKS

	Points	Constraints
1	7	No. of lines of the letter = 1 $1 \leq \text{Length of the letter} \leq 30$ The letter contains no spaces
2	3	No additional constraints

HINT

Combine `while` and `cin` for the input.

TC22A2 Diskalmer

Score	20
Time Limit	1s
Memory Limit	256MB

Does this guy know English?

We all know, the tutors in C++ Coding Workshop are very bad at English. Therefore they always put a “Diskalmer” in their slides, let all the viewers prepare for the horrible English that they are going to face. Aside all these efforts, some still ask “Does this guy know English?” after reading the slides.

Now, a person is asked to write down all vocabularies he/she knows, the person then wrote N vocabularies, which a vocabulary may appear more than once. If he/she is not a tutor (i.e. good at English), he/she could write down more than M distinct (different) English vocabulary, otherwise if he/she wrote less than M distinct (different) English vocabulary, he/she is a C++ Coding Workshop tutors (i.e. bad at English). Can you write a program to determine whether the person is a tutor or not?

Note that the vocabularies are case-sensitive (i.e. upper-case and lower-case letters are considered different).

INPUT

The first line contains two integers N and M , representing number of English vocabularies the person wrote and the number of distinct vocabulary that he/she need to know to be called "good at English" (i.e. not a tutor) respectively.

The i^{th} line of next N lines contains a string S_i , the i^{th} vocabulary the person wrote down, which consists of lower-case and upper-case English letters only.

OUTPUT

If the person is not a tutor (i.e. good at English), output Non-tutor.

If the person is a tutor (i.e. bad at English), output Tutor.

SAMPLE TESTS

	Input	Output
1	6 3 Hello Yo Hello Apple Banana Canana	Non-tutor

	Input	Output
2	6 3 Hello Yo Yo Hello Hello Yo	Tutor

CONSTRAINTS

$$1 \leq M \leq N \leq 10000$$

$$1 \leq \text{Length of } S_i \leq 16$$

SUBTASKS

	Points	Constraints
1	10	$1 \leq M = N \leq 100$
2	7	$1 \leq M \leq N \leq 100$
3	3	No additional constraints

HINT

Use array or some better data structure which can achieve $O(\lg n)$.

TC22A3 Bob the Builder

Score 30
Time Limit 1s
Memory Limit 256MB

Bob the Builder! Can we fix it?

Bob the Builder! Yes, we can!

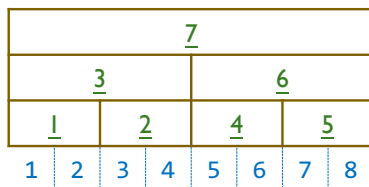
Your friend, Bob, the Builder, is going to build a spectacular skyscraper! You, as a friend of him, decided to help him with that.

Bob builds the skyscraper by following this rule:

The width of each block composing the i^{th} floor is 2^i units. If an upper floor is available to be built, build it first. Otherwise, build the next block at the highest floor possible from left to right. The only block on the N^{th} floor (highest floor) in the building of height N has the width of 2^N .

You are asked to find the building order of the skyscraper of height N . And output the left and right bound of each block built, in order of the building order.

The graph below represents a building of height 3, the numbers underlined represent the building order.



INPUT

An integer N , which represents the height of the building.

OUTPUT

Output $2^N - 1$ lines, each line should contains 2 integers, separated by a space, which represents the left and right bound of the layer built.

SAMPLE TESTS

	Input	Output
1	2	1 2 3 4 1 4

2	3	1 2 3 4 1 4 5 6 7 8 5 8 1 8
---	---	---

This is the same example as stated in the problem statement.

CONSTRAINTS

$$2 \leq N \leq 16$$

SUBTASKS

	Points	Constraints
1	10	$2 \leq N \leq 4$
2	20	No additional constraints

HINT

Use recursion.

TC22A4 Two Stone One Bird

Score 35
Time Limit 1s
Memory Limit 256MB

*Killing two stones with one bird... uhh no f***...*

There is an idiom called “kill two birds with one stone”, but Karry don’t think like that, he said to others “killing two stones with one bird” is more likely to happen in the real life. That seems like a very difficult philosophy problem, but this is actually very simple. Let us use a program to solve the birds and stones situation!

You are given the number of stones S and the number of birds B appeared, can you reverse-engineer how many “one stone two birds” and how many “two stones one bird” situation happen respectively?

INPUT

The input consists of two integers, S and B , separated by a space, indicating the number of stones and number of birds appeared respectively.

OUTPUT

If no combination of “one stone two birds” and “two stone one birds” situation happened can make up the number of stones and number of birds given, we called the data “invalid”, then output only one line: `Impossible`.

Otherwise, we called the data “valid”, then output two integers, separated by a space.

The first integer is the number of “two birds one stone” situation happened.

The second integer is the number of “two stone one birds” situation happened.

SAMPLE TESTS

	Input	Output
1	5 10	5 0

When there is 5 “one stone two birds” situation happened and no “two stone one birds” situation happened, there will be $5 \times 1 + 0 \times 2 = 5$ stones and $5 \times 2 + 0 \times 1 = 10$ birds.

2	6 3	0 3
---	-----	-----

When there is no “one stone two birds” situation happened and 3 “two stone one birds” situation happened, there will be $0 \times 1 + 3 \times 2 = 6$ stones and $0 \times 2 + 3 \times 1 = 3$ birds.

3	17 13	3 7
---	-------	-----

When there is 3 “one stone two birds” situation happened and 7 “two stone one birds” situation happened, there will be $3 \times 1 + 7 \times 2 = 17$ stones and $3 \times 2 + 7 \times 1 = 13$ birds.

4	9 5	Impossible
---	-----	------------

There is no combination of “two birds one stone” and “two stone one birds” situation happened that can make up 9 stones and 5 birds.

CONSTRAINTS

$$0 \leq S, B \leq 10^9$$

SUBTASKS

	Points	Constraints
1	5	$0 \leq S, B \leq 2$
2	5	$0 \leq S, B \leq 100$ There is no “one stone two birds” situation happened It is guaranteed that the data given is “valid”
3	5	$0 \leq S, B \leq 100$ There is no “two stones one bird” situation happened It is guaranteed that the data given is “valid”
4	5	$0 \leq S, B \leq 100$ It is guaranteed that the data given is “valid”
5	10	It is guaranteed that the data given is “valid”
6	5	No additional constraints

HINT

Use mathematical knowledge for a full mark solution.