Ungraded Homework 2

CSE110 Section 11, 39, 49 | *Fall 2022* | *Brac University*

Prepared by: `Dibyo Fabian Dofadar` **(DFD)**

Problem 1: Enjoy the Offer

A supermarket is doing a sales promotion for soft drinks. If one day you buy soft drinks and bring the empty bottles the next day, they exchange each set of K empty bottles for a full one. A customer wants to make the most of this offer and therefore bought several bottles on the first day of the promotion. Now he wants to know how many bottles he will have at the end of the second day of the promotion if he uses it to the fullest. Make a program to calculate this.

Input

The input contains two integers **N** and **K**, respectively the number of soft drinks bought and the number of empty bottles to gain a full.

Output

Print the number of bottles that the customer will have on the second day, if he makes the most of the offer.

Input Sample	Output Sample
7 4	4
4 7	4
4000 7	574

Problem 2: Approximate Number of Primes

Schoenfeld and Rosser published a paper in 1962 describing a minimum and a maximum value to the quantity of prime numbers up to **n**, for **n** ≥ 17. This quantity is represented by the function **π(n)** and the inequality is shown below.

$$\frac{n}{\ln(n)} < \pi(n) < 1.25506\frac{n}{\ln(n)}$$

Your task is, given a natural number **n**, to compute the interval's minimum and maximum values to the approximate number of primes up to **n**.

Input

The input is a natural number **n** .

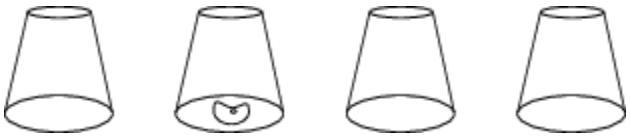
Output

The output is given as two values **P** and **M** with 1 decimal place each, such that **P** < **π(n)** < **M** according to the given inequality above. These two values have one blank space between them.

Input Samples	Output Samples
17	6.0 7.5
50	12.8 16.0
100	21.7 27.3

Problem 3: Bean

It is said in the surroundings of Montes Claros that, long ago in the municipal market, Sebastião and his companions of work always played a game of divination after the delivery of agricultural products harvested in the week that happened. The game, "Guess Where the Bean is", consists of hiding a grain of beans in one of four opaque glasses, and after shuffling them, the bettor must guess in which glass the vegetable is.



This year, due to the great cultural and historical success and the enormous number of people who practice this game in the municipal market, the city council decided to hold a "Guess Where the Bean is " championship. However, she needs a program to show viewers where the beans were after the end of a game. Knowing that the next Programming Marathon will take place in the city, she soon commissioned a solution from the excellent programmers. In this way, you should assist the organization in this mission with a program that will inform, at the end of a match, where the beans were.

Input

The input will contain only one string containing the states of four cups (C_1, C_2, C_3 and C_4) separated by a space in between. The value $C_i = 1$ indicates that the beans were in cup number i, and $C_i = 0$ indicates that the i^{th} cup was empty at the end of the game. There will always be exactly one glass with the beans.

Output

Write in the output a line containing an integer between 1 and 4, corresponding to the position where the beans were.

Input Samples	Output Samples
0 0 0 1	4
0 1 0 0	2
0 0 1 0	3

Problem 4: Parity

The popularity of WiFi networks increased the loss rate of data being transferred, as several environment factors can easily compromise the data during traffic. The main goal of URI, Unity of Recovery of Information, is to identify and correct errors in messages being sent through WiFi networks.

The technique used by URI to identify errors is the parity test, which can be described as follows: Be S a message that is going to be sent from one device to another. Before S is sent, an extra bit B is added to the end of the binary representation of S. If S has an even number of bits of value 1, the extra bit B will have value 0. Otherwise, if S has an odd number of bits of value 1, B will have value 1. In this way, after the insertion of the bit B, the message S will have an even number of bits of value 1.

When the receiver gets the message S he counts how many bits of value 1 the message has. If the quantity is even, it means that the message was transferred successfully. Otherwise, it means that the message had a modification and is not correct.

Your task is to write an algorithm that makes the insertion of the extra bit B in the message S, ensuring that after the insertion the message S has an even number of bits of value 1.

Input

The input consists of one string containing the message S.

Output

Print one line containing the message S with the extra bit B.

Input Samples	Output Samples
10	101
000110	0001100
0	00

Problem 5: Identifying Tea

Blind tea tasting is the skill of identifying a tea by using only your senses of smell and taste.

As part of the Ideal Challenge of Pure-Tea Consumers (ICPC), a local TV show is organized. During the show, a full teapot is prepared and five contestants are handed a cup of tea each. The participants must smell, taste and assess the sample so as to identify the tea type, which can be: (1) white tea; (2) green tea; (3) black tea; or (4) herbal tea. At the end, the answers are checked to determine the number of correct guesses.

Given the actual tea type and the answers provided, determine the number of contestants who got the correct answer.

Input

The first line contains an integer **T** representing the tea type ($1 \leq \mathbf{T} \leq 4$). The second line contains a string, indicating the answer given by five contestants, separated by a space in between.

Output

Output a line with an integer representing the number of contestants who got the correct answer.

Input Samples	Output Samples
1 1 2 3 2 1	2
3 4 1 1 2 1	0
2 1 2 1 2 2	3

Problem 6: Squared and Cubic

Write a program that reads an integer N. This N is the number of output lines printed by this program.

Input

The input file contains an integer N.

Output

Print the output according to the given example.

Input Sample	Output Sample
5	1 1 1 2 4 8 3 9 27 4 16 64 5 25 125

Problem 7: Iccanobif

"Iccanobif" sequences are sequences where each term is always equal to the sum of the next two subsequent to it. Except for the last two terms which are always equal to 1

Example of an Iccanobif sequence with 10 terms: 55, 34, 21, 13, 8, 5, 3, 2, 1, 1.

Your task is, given an integer value, print the corresponding size Iccanobif sequence.

Input

The entry consists of a single integer **N** representing the size of the desired Iccanobif sequence.

Output

The output consists of a single line containing the terms of the Iccanobif sequence of **N** size separated by a single space.

Input Samples	Output Samples
3	2 1 1
5	5 3 2 1 1
10	55 34 21 13 8 5 3 2 1 1
2	1 1
1	1

Problem 8: Fast Fibonacci

Binet's formula is a way to calculate Fibonacci numbers.

$$\text{Fibonacci}\left(n\right) \approx \frac{\left(\frac{1+\sqrt{5}}{2}\right)^n - \left(\frac{1-\sqrt{5}}{2}\right)^n}{\sqrt{5}}$$

Your task is, given a natural number **n**, to compute the value of Fibonacci(**n**) using the formula above.

Input

The input is a natural number **n** .

Output

The output is the value of Fibonacci(**n**) with 1 decimal place using the given Binet's formula.

Input Samples	Output Samples
1	1.0
2	1.0
3	2.0
10	55.0

Problem 9: Game Time

Read the start time and end time of a game, in hours. Then calculate the duration of the game, knowing that the game can begin in a day and finish in another day, with a maximum duration of 24 hours. The message must be printed in portuguese "O JOGO DUROU X HORA(S)" that means "THE GAME LASTED X HOUR(S)".

Input

A string containing the start and end time of a game, separated by a space.

Output

Print the duration of the game as in the sample output.

Input Samples	Output Samples
16 2	O JOGO DUROU 10 HORA(S)
0 0	O JOGO DUROU 24 HORA(S)
2 16	O JOGO DUROU 14 HORA(S)