acm International Collegiate Programming Contest

IBM event sponsor

ACM International Collegiate Programming Contest

2014

Latin American Regional Contests

November 7th-8th, 2014

Warmup Session

This problem set contains 3 problems; pages are numbered from 1 to 3.

This problem set is used in simultaneous contests hosted in the following countries:

Argentina, Bolivia, Brasil, Chile, Colombia, Cuba,
México, Panamá, Perú, República Dominicana and Venezuela

General information

Unless otherwise stated, the following conditions hold for all problems.

Program name

1. Your solution must be called *codename*`.c`, *codename*`.cpp` or *codename*`.java`, where *codename* is the capital letter which identifies the problem.

Input

1. The input must be read from standard input.
2. The input consists of a single test case, which is described using a number of lines that depends on the problem. No extra data appear in the input.
3. When a line of data contains several values, they are separated by *single* spaces. No other spaces appear in the input. There are no empty lines.
4. The English alphabet is used. There are no letters with tildes, accents, diareses or other diacritical marks (ñ, Ã, é, Ì, ô, Ü, ç, etcetera).
5. Every line, including the last one, has the usual end-of-line mark.

Output

1. The output must be written to standard output.
2. The result of the test case must appear in the output using a number of lines that depends on the problem. No extra data must appear in the output.
3. When a line of results contains several values, they must be separated by *single* spaces. No other spaces should appear in the output. There should be no empty lines.
4. The English alphabet must be used. There should be no letters with tildes, accents, diareses or other diacritical marks (ñ, Ã, é, Ì, ô, Ü, ç, etcetera).
5. Every line, including the last one, must have the usual end-of-line mark.
6. To output real numbers, round them to the closest rational with the required number of digits after the decimal point. Test case is such that there are no ties when rounding as specified.

Development team

The following persons helped to develop the problem set by creating and improving statements, solutions, test cases and input and output checkers:

Alejandro Strejilevich de Loma, Universidad de Buenos Aires

Bruno Junqueira Adami, Universidade de São Paulo

Cristhian Bonilha, Universidade Tecnológica Federal do Paraná

Fidel I. Schaposnik Massolo, Universidad Nacional de La Plata

Guilherme Albuquerque Pinto, Universidade Federal de Juiz de Fora

Jorge Enrique Moreira Broche, Universidad Central "Marta Abreu" de Las Villas

Pablo Ariel Heiber, Universidad de Buenos Aires

Yonny Mondelo Hernández, Universidad de las Ciencias Informáticas

Problem A – The fellowship of the ring

Author: Pablo Ariel Heiber, Universidad de Buenos Aires

Box is a really violent sport. To compensate, there is a code of conduct to maintain chivalry and fellowship atop the ring in friendly matches. One of the most well known rules of this code of conduct is to avoid hitting the opponent below the waist or above the neck.

Given the heights of the waist and neck of an opponent, and the heights of a set of punches, calculate how many of those punches are fair according to the rule above.

Input

The first line contains three integers W, N and P, representing respectively the height of the waist of the opponent, the height of his neck, and the number of thrown punches ($1 \leq W < N \leq 200$ and $1 \leq P \leq 100$). The second line contains P integers $H_1, H_2, \ldots, H_P$ ($1 \leq H_i \leq 200$ for $i = 1, 2, \ldots, P$) indicating the heights of the punches. All heights are given in centimeters.

Output

Output a line with an integer representing the number of punches that are fair, according to the code of conduct.

Sample input 1	**Sample output 1**
`80 150 3` `10 100 160`	`1`

Sample input 2	**Sample output 2**
`80 150 3` `80 100 150`	`3`

Sample input 3	**Sample output 3**
`2 199 5` `2 1 200 199 1`	`2`

Problem B – The two towers

Author: Pablo Ariel Heiber, Universidad de Buenos Aires

A *two tower* of height H is a mathematical expression of the form

$$2^{2^{2^{\cdot^{\cdot^{\cdot^{2}}}}}}$$

with the number two appearing exactly H times. The value of a two tower is the value of the corresponding expression. For instance, the value of the two tower of height 1 is 2, the value of the two tower of height 2 is $2^2 = 4$ and the value of the two tower of height 4 is

$$2^{2^{2^2}} = 65536.$$

The value of the two tower of height 5 is therefore 2^{65536} and there is not enough space on this sheet of paper to write it in full.

Given that the values of two towers can grow really big, we are wondering if you can help us find the remainder of such values when divided by 3.

Input

The input consists of a single line that contains an integer H representing the height of the two tower we want to consider ($1 \leq H \leq 10^{100}$).

Output

Output a line with an integer representing the remainder of dividing the value of the two tower of height H by 3.

Sample input 1	**Sample output 1**
1	2

Sample input 2	**Sample output 2**
2	1

Sample input 3	**Sample output 3**
99999999999999999999	1

Problem C – The return of the King

Author: Pablo Ariel Heiber, Universidad de Buenos Aires

The prolific author Stephen King was entering the grades of his literature students in an on-line general average calculator. When he finished, he noticed his return key was broken so instead of entering the grades of a student in a separate line each, he entered them in a single line without any separation. Since Mr. King does not have the skills to fix his return key right away, he needs you to calculate the average of the grades of the student from the non-separated input.

Each grade is an integer between 1 and 10. All grades were entered written in base 10 without leading zeros. For example, if the grades of Mr. King's student were 3, 10, 1 and 10 they would be entered as "`310110`".

Input

The input consists of a single line that contains a non-empty string S of at most 100 base 10 digits. There is a unique way to partition S into a list of substrings such that each substring represents an integer between 1 and 10 in base 10 without leading zeros.

Output

Output a line with a rational number representing the average of the grades of the student whose grades Mr. King entered as S. The result must be output as a rational number with exactly two digits after the decimal point, rounded if necessary.

Sample input 1	**Sample output 1**
`310110`	`6.00`

Sample input 2	**Sample output 2**
`10910`	`9.67`

Sample input 3	**Sample output 3**
`222222223`	`2.11`