

Surprise Language Round #5

A. A + B

time limit per test: 2 seconds
memory limit per test: 256 megabytes
input: standard input
output: standard output

You are given two integers A and B . Calculate their sum and output it without leading zeros.

Input

Two lines of input data contain integers A and B ($1 \leq A, B \leq 10^5$).

Output

Output $A + B$ without leading zeros.

Examples

input
12 3
output
15

input
100 5
output
105

Note

The code provided in the post about the round doesn't solve the task.

B. Binary notation

time limit per test: 2 seconds
memory limit per test: 256 megabytes
input: standard input
output: standard output

You are given a positive integer n . Output its binary notation.

Input

The only line of input data contains an integer n ($1 \leq n \leq 10^6$).

Output

Output the binary notation of n (without any leading zeros).

Examples

input
5
output
101

input
13
output
1101

Note

In the first example $5 = 1 * 2^2 + 0 * 2^1 + 1 * 2^0$.

C. Caesar Cipher

time limit per test: 2 seconds
memory limit per test: 256 megabytes
input: standard input
output: standard output

Caesar cipher is one of the simplest encryption techniques. To transform the original message into encrypted one using key k , one has to replace each letter with a letter which is k positions later in the alphabet (if this takes the position beyond Z, the rest of it is counted from the start of the alphabet). In a more formal way, if letters of the alphabet are enumerated starting with 0, the result of encryption for character X will be $(x + k) \bmod 26$ (26 is the number of letters in the Latin alphabet).

You are given the original message and the encryption key k . Output the resulting cipher.

Input

The first line of input contains the original message — a sequence uppercase Latin letters («A»-«Z»). The length of the message is from 1 to 10, inclusive.

The second line contains an integer k ($0 \leq k \leq 25$).

Output

Output the result of encryption.

Examples

input
CODEFORCES 5
output
HTIJKTWHJX

input
WIXYZILWYM 6
output
CODEFORCES

D. Date Change

time limit per test: 2 seconds
memory limit per test: 256 megabytes
input: standard input
output: standard output

You are given a date in "DD.MM.YYYY" ("day.month.year") format and a number of days *shift* you have to add to this date. Output the resulting date.

Input

The first line of input contains the date in "DD.MM.YYYY" format: two digits for day (with leading zero if needed), dot, two digits for month (with leading zero if needed), dot, four digits for year. The notation is guaranteed to give a valid date between 1980 and 2020, inclusive.

The second line contains an integer *shift* ($-1000 \leq shift \leq 1000$).

Output

Output a date equal to the given one + *shift* days, in the same format "DD.MM.YYYY".

Examples

input
10.02.2012 12
output
22.02.2012

input
01.02.2010 -40
output
23.12.2009

input
01.01.2000 365
output
31.12.2000

input
13.08.1990 -609
output
12.12.1988

Note

When manipulating the dates, take into account leap years; don't care about time zones/daylight saving time.

E. Euclidean Distance

time limit per test: 2 seconds
memory limit per test: 256 megabytes
input: standard input
output: standard output

You are given a multiset of points on the plane with integer coordinates. Find the maximum distance between two points from this multiset.

Input

The first line of input contains the number of points n ($2 \leq n \leq 50$). Next, n pairs of lines follow, each describing a single point: the first line contains x -coordinate, the second one — the y -coordinate ($-50 \leq x, y \leq 50$). Some of the points can have identical coordinates.

Output

Output the maximum distance between two points from this multiset. The answer is considered to be correct if its absolute or relative error does not exceed 10^{-4} .

Examples

input
3 0 1 2 3 4 5
output
5.656854249

input
3 10 12 -5 8 10 12
output
15.5241747

Note

In the first case the maximum distance is between points $(0, 1)$ and $(4, 5)$. In the second case two of the points are the same, so the maximum distance is between one of them and the third point.