Codeforces Round #491 (Div. 2)

A. If at first you don't succeed...

time limit per test: 1 second
memory limit per test: 256 megabytes
input: standard input
output: standard output

Each student eagerly awaits the day he would pass the exams successfully. Thus, Vasya was ready to celebrate, but, alas, he didn't pass it. However, many of Vasya's fellow students from the same group were more successful and celebrated after the exam.

Some of them celebrated in the BugDonalds restaurant, some of them — in the BeaverKing restaurant, the most successful ones were fast enough to celebrate in both of restaurants. Students which didn't pass the exam didn't celebrate in any of those restaurants and elected to stay home to prepare for their reexamination. However, this quickly bored Vasya and he started checking celebration photos on the Kilogramm. He found out that, in total, BugDonalds was visited by $$$A$$$ students, BeaverKing — by $$$B$$$ students and $$$C$$$ students visited both restaurants. Vasya also knows that there are $$$N$$$ students in his group.

Based on this info, Vasya wants to determine either if his data contradicts itself or, if it doesn't, how many students in his group didn't pass the exam. Can you help him so he won't waste his valuable preparation time?

Input
The first line contains four integers — $$$A$$$, $$$B$$$, $$$C$$$ and $$$N$$$ ($$$0 \leq A, B, C, N \leq 100$$$).

Output
If a distribution of $$$N$$$ students exists in which $$$A$$$ students visited BugDonalds, $$$B$$$ — BeaverKing, $$$C$$$ — both of the restaurants and at least one student is left home (it is known that Vasya didn't pass the exam and stayed at home), output one integer — amount of students (including Vasya) who did not pass the exam.

If such a distribution does not exist and Vasya made a mistake while determining the numbers $$$A$$$, $$$B$$$, $$$C$$$ or $$$N$$$ (as in samples 2 and 3), output $$$-1$$$.

Examples

input
10 10 5 20
output
5

input
2 2 0 4
output
-1

input
2 2 2 1
output
-1

Note
The first sample describes following situation: $$$5$$$ only visited BugDonalds, $$$5$$$ students only visited BeaverKing, $$$5$$$ visited both of them and $$$5$$$ students (including Vasya) didn't pass the exam.

In the second sample $$$2$$$ students only visited BugDonalds and $$$2$$$ only visited BeaverKing, but that means all $$$4$$$ students in group passed the exam which contradicts the fact that Vasya didn't pass meaning that this situation is impossible.

The third sample describes a situation where $$$2$$$ students visited BugDonalds but the group has only $$$1$$$ which makes it clearly impossible.

B. Getting an A

time limit per test: 1 second
memory limit per test: 256 megabytes
input: standard input
output: standard output

Translator's note: in Russia's most widespread grading system, there are four grades: 5, 4, 3, 2, the higher the better, roughly corresponding to A, B, C and F respectively in American grading system.

The term is coming to an end and students start thinking about their grades. Today, a professor told his students that the grades for his course would be given out automatically — he would calculate the simple average (arithmetic mean) of all grades given out for lab works this term and round to the nearest integer. The rounding would be done in favour of the student — $$$4.5$$$ would be rounded up to $$$5$$$ (as in example 3), but $$$4.4$$$ would be rounded down to $$$4$$$.

This does not bode well for Vasya who didn't think those lab works would influence anything, so he may receive a grade worse than $$$5$$$ (maybe even the dreaded $$$2$$$). However, the professor allowed him to redo some of his works of Vasya's choosing to increase his average grade. Vasya wants to redo as as few lab works as possible in order to get $$$5$$$ for the course. Of course, Vasya will get $$$5$$$ for the lab works he chooses to redo.

Help Vasya — calculate the minimum amount of lab works Vasya has to redo.

Input
The first line contains a single integer $$$n$$$ — the number of Vasya's grades ($$$1 \leq n \leq 100$$$).

The second line contains $$$n$$$ integers from $$$2$$$ to $$$5$$$ — Vasya's grades for his lab works.

Output
Output a single integer — the minimum amount of lab works that Vasya has to redo. It can be shown that Vasya can always redo enough lab works to get a $$$5$$$.

Examples

input
3 4 4 4
output
2

input
4 5 4 5 5
output
0

input
4 5 3 3 5
output
1

Note
In the first sample, it is enough to redo two lab works to make two $$$4$$$s into $$$5$$$s.

In the second sample, Vasya's average is already $$$4.75$$$ so he doesn't have to redo anything to get a $$$5$$$.

In the second sample Vasya has to redo one lab work to get rid of one of the $$$3$$$s, that will make the average exactly $$$4.5$$$ so the final grade would be $$$5$$$.

C. Candies

time limit per test: 1 second
memory limit per test: 256 megabytes
input: standard input
output: standard output

After passing a test, Vasya got himself a box of $$$n$$$ candies. He decided to eat an equal amount of candies each morning until there are no more candies. However, Petya also noticed the box and decided to get some candies for himself.

This means the process of eating candies is the following: in the beginning Vasya chooses a single integer $$$k$$$, same for all days. After that, in the morning he eats $$$k$$$ candies from the box (if there are less than $$$k$$$ candies in the box, he eats them all), then in the evening Petya eats $$$10\%$$$ of the candies **remaining** in the box. If there are still candies left in the box, the process repeats — next day Vasya eats $$$k$$$ candies again, and Petya — $$$10\%$$$ of the candies left in a box, and so on.

If the amount of candies in the box is not divisible by $$$10$$$, Petya rounds the amount he takes from the box down. For example, if there were $$$97$$$ candies in the box, Petya would eat only $$$9$$$ of them. In particular, if there are less than $$$10$$$ candies in a box, Petya won't eat any at all.

Your task is to find out the minimal amount of $$$k$$$ that can be chosen by Vasya so that he would eat at least half of the $$$n$$$ candies he initially got. Note that the number $$$k$$$ must be integer.

Input
The first line contains a single integer $$$n$$$ ($$$1 \leq n \leq 10^{18}$$$) — the initial amount of candies in the box.

Output
Output a single integer — the minimal amount of $$$k$$$ that would allow Vasya to eat at least half of candies he got.

Example

input
68
output
3

Note
In the sample, the amount of candies, with $$$k=3$$$, would change in the following way (Vasya eats first):

$$$68 \to 65 \to 59 \to 56 \to 51 \to 48 \to 44 \to 41 \\ \to 37 \to 34 \to 31 \to 28 \to 26 \to 23 \to 21 \to 18 \to 17 \to 14 \\ \to 13 \to 10 \to 9 \to 6 \to 6 \to 3 \to 3 \to 0$$$.

In total, Vasya would eat $$$39$$$ candies, while Petya — $$$29$$$.

D. Bishwock

time limit per test: 1 second
memory limit per test: 256 megabytes
input: standard input
output: standard output

Bishwock is a chess figure that consists of three squares resembling an "L-bar". This figure can be rotated by 90, 180 and 270 degrees so it can have four possible states:

```
XX   XX   .X   X.
X.   .X   XX   XX
```

Bishwocks don't attack any squares and can even occupy on the adjacent squares as long as they don't occupy the same square.

Vasya has a board with $$$2\times n$$$ squares onto which he wants to put some bishwocks. To his dismay, several squares on this board are already occupied by pawns and Vasya can't put bishwocks there. However, pawns also don't attack bishwocks and they can occupy adjacent squares peacefully.

Knowing the positions of pawns on the board, help Vasya to determine the maximum amount of bishwocks he can put onto the board so that they wouldn't occupy the same squares and wouldn't occupy squares with pawns.

Input
The input contains two nonempty strings that describe Vasya's board. Those strings contain only symbols "0" (zero) that denote the empty squares and symbols "X" (uppercase English letter) that denote the squares occupied by pawns. Strings are nonempty and are of the same length that does not exceed $$$100$$$.

Output
Output a single integer — the maximum amount of bishwocks that can be placed onto the given board.

Examples

input
00 00
output
1

input
00X00X0XXX0 0XXX0X00X00
output
4

input
0X0X0 0X0X0
output
0

input

0XXX0 00000
output
2

E. Bus Number

time limit per test: 1 second
memory limit per test: 256 megabytes
input: standard input
output: standard output

This night wasn't easy on Vasya. His favorite team lost, and he didn't find himself victorious either — although he played perfectly, his teammates let him down every time. He had to win at least one more time, but the losestreak only grew longer and longer... It's no wonder he didn't get any sleep this night at all.

In the morning, Vasya was waiting the bus to the university on the bus stop. Vasya's thoughts were hazy and so he couldn't remember the right bus' number quite right and got onto the bus with the number $$$n$$$.

In the bus, Vasya thought that he could get the order of the digits in the number of the bus wrong. Futhermore, he could "see" some digits several times, but the digits he saw were definitely in the real number of the bus. For example, if Vasya saw the number `2028`, it could mean that the real bus number could be `2028`, `8022`, `2820` or just `820`. However, numbers `80`, `22208`, `52` definitely couldn't be the number of the bus. Also, real bus number couldn't start with the digit `0`, this meaning that, for example, number `082` couldn't be the real bus number too.

Given $$$n$$$, determine the total number of possible bus number variants.

Input
The first line contains one integer $$$n$$$ ($$$1 \leq n \leq 10^{18}$$$) — the number of the bus that was seen by Vasya. It is guaranteed that this number does not start with $$$0$$$.

Output
Output a single integer — the amount of possible variants of the real bus number.

Examples

input
97
output
2

input
2028
output
13

Note
In the first sample, only variants $$$97$$$ and $$$79$$$ are possible.

In the second sample, the variants (in the increasing order) are the following: $$$208$$$, $$$280$$$, $$$802$$$, $$$820$$$, $$$2028$$$, $$$2082$$$, $$$2208$$$, $$$2280$$$, $$$2802$$$, $$$2820$$$, $$$8022$$$, $$$8202$$$, $$$8220$$$.

F. Concise and clear

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

Vasya is a regular participant at programming contests and is already experienced in finding important sentences in long statements. Of course, numbers constraints are important — factorization of a number less than `1000000` is easier than of a number less than `1000000000`. However, sometimes it's hard to understand the number at the first glance. Could it be shortened? For example, instead of `1000000` you could write $$$10^{6}$$$, instead of `1000000000` —$$$10^{9}$$$, instead of `1000000007` — $$$10^{9}+7$$$.

Vasya decided that, to be concise, the notation should follow several rules:

- the notation should only consist of numbers, operations of addition ("`+`"), multiplication ("`*`") and exponentiation ("`^`"), in particular, the use of braces is forbidden;
- the use of several exponentiation operations in a row is forbidden, for example, writing "`2^3^4`" is unacceptable;
- the value of the resulting expression equals to the initial number;
- the notation should consist of the minimal amount of symbols.

Given $$$n$$$, find the equivalent concise notation for it.

Input
The only line contains a single integer $$$n$$$ ($$$1 \leq n \leq 10\,000\,000\,000$$$).

Output
Output a concise notation of the number $$$n$$$. If there are several concise notations, output any of them.

Examples

input
2018
output
2018

input
1000000007
output
10^9+7

input
10000000000
output
100^5

input
2000000000
output
2*10^9

Note
The third sample allows the answer `10^10` also of the length $$$5$$$.