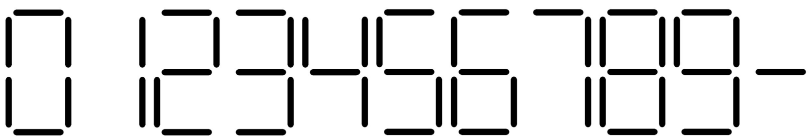
Problem L. How many lines

Input file:	`l.in`
Output file:	`l.out`
Time limit:	1 second
Memory limit:	64 Mebibytes

A famous programmer Peter has an idea to create a completely new exciting computer game, which the other leading computer games firms have not even dreamed about. Peter is sure that due to revolutionary features, which he is going to realize, his game will win the market and will give him the world fame and enormous profit.

The system to display results in a table of records will be one of such features. Every result is a decimal number. But the digits and the minus will be displayed with the help of several lines:



Help Peter to find out how many lines his program would draw when the player reaches certain number of points.

Input

In the only line contains an integer X ($-10^9 \le X \le 10^9$), which defines the number earned of points.

Output

Output one integer number – the number of lines, which are necessary to display the result.

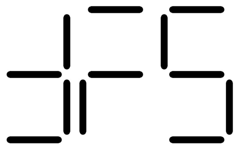
Examples

l.in	l.out
85	12
-3	6

Problem M. Restore the score

Input file:	`m.in`
Output file:	`m.out`
Time limit:	1 second
Memory limit:	64 Mebibytes

Not less famous hacker Vasia after having seen Peter's game decided to spoil it a little. He edited the code in the subprogram for displaying the number of points in such way, that every line used in the image could be displayed or missed. Thus the player couldn't understand at once how many points he had. For example, the number 325 could be displayed as



But the number 986 could be written in such way too so as several other numbers. Your goal is to define from the image the number of integer numbers which define the number of points that could be written such way.

Input

The first line contains a number K ($1 \leq K \leq 9$) – the number of characters that were necessary to display. The each of the following K lines contains 7 digits each; every digits equals 0 or 1. These lines correspond to the lines in the map of the corresponding character of the number; the lines are counted down and left to right. Thus the first digit corresponds to the very top line, the second one corresponds to the upper left line, the third – to the upper right, the fourth – to the middle, the fifth – to the lower left, the sixth – to the lower right, the seventh – to the very bottom. The value 1 means the existence of the line, the value 0 means the absence. The map (or image) is described left to right, so the description of the image of the very left character of the is given first, the very right character is the last one.

Output

Output one integer number – the quantity of the numbers, which can be displayed the given way. Take into account that no lines also can be displayed when displaying some character, but however any place for a character has not to be empty in the case of the right displaying .

Examples

m.in	m.out
3 0011011 1001100 1101011	36
1 1110111	2
2 0000000 0000000	99

Problem N. How to break all records

Input file:	`n.in`
Output file:	`n.out`
Time limit:	1 second
Memory limit:	64 Mebibytes

Besides the famous programmers and hackers, there are widely known gamers too. By the way, Kolia is one of them. He likes playing computer games and making records.

Once he saw Peter's game and decided to achieve such a record which nobody would be ever able to break. Obviously it is necessary to score the maximum amount of points to do this. Kolia knows that the player has 0 points at the start of the game. At the every step he can score from a to b points inclusively (the negative numbers also exist – they mean that the player has a penalty of some amount of points). The number of steps is unlimited, but the game can be over every necessary moment.

Moreover hacker Vasia said in secret, for storing the number of points in the Peter's program the variable n (signed byte integer) is used. So the number of points can take any value from -2^{8n-1} to $2^{8n-1}-1$. Such variables have the property: if 1 is added to the maximum value ($2^{8n-1}-1$), the overflow is occurred and as a result we have minimum (-2^{8n-1}). The reverse is also right – if the minimum value is subtracted by one (it means adding -1) the maximum is obtained. The addition of any positive integer k means k-multiple application of increment operation. Similarly, the addition of a negative integer means the application of the decrement operation the necessary number of times.

Help Kolia to find out the minimum number of steps, which he needs to achieve the maximum amount of points.

Input

The only line contains three integers n, a and b ($1 \le n \le 8$, $-2^{8n-1} \le a \le 0 \le b \le 2^{8n-1}-1$).

Output

The only output line must have one number – the number of steps to set the record, which is equal to the maximum representable number of points. If it's impossible to do this output the number -1.

Examples

n.in	n.out
`1 0 8`	`16`
`2 -1 151`	`217`
`4 -1000000 0`	`2148`

Problem O. Secret level

Input file:	`o.in`
Output file:	`o.out`
Time limit:	1 second
Memory limit:	64 Mebibytes

Having played Peter's game sufficient time, Kolia revealed a new secret level in the game, and in order to access to it one needs to input a secret code and wait for a long time for it's verification. Once Kolia saw the code, which Peter entered while playing his game, and remembered it. But after trying to enter it himself he got the message, that the code was invalid. Because of the fact that the level promised to be extremely rich with different features Kolia decided that he had to get to it and asked hacker Vasia to help him. After the long studying of code of Peter's game Vasia wasn't able to get down the protection from that level, but he found out how one can get that code.

The way of getting the code is as follows. A number, equal to computer serial number where the game is launched, is taken. Then every digit of the number is multiplied by itself, the numbers obtained are written next to each other, and thus we obtain a new number. This operation is executed the number of times equal to the number of reboots during the day. The code will be the number of digits in the final number.

Input

The only line consists of the number of reboots k and Kolia's computer serial number N ($0 \le k \le 100$, $0 \le N \le 10^{13}$).

Output

The only output line must consist a number – the code for the secret level in Peter's game.

Examples

o.in	o.out
1 85	4
2 4	3

Note

In the first example after squaring each digit a number 6425 is obtained, which consists of four digits. In the second example 4 is squared at first – 16 is obtained, and after squaring every digit of 16 three-digit 136 is obtained.

Problem P. Battlefields

Input file:	`p.in`
Output file:	`p.out`
Time limit:	1 second
Memory limit:	64 Mebibytes

Peter assumes to make battles between armies of opponents on the rectangle battlefields, broken into squares, in his game. Such fields take place in many games, but Peter's thought is in the fact, that every battlefield will consist of a certain number of cells. The each of the following battles will take place at the field which has one more cell than the previous one. The length and width of the fields are not important, they can be selected whatever one likes. However, the fields of the size $1 \times k$ are considered too simple by Peter, and he doesn't want them to be used in his game.

It is known that N battles will take place in the game. Help Peter to choose the number of the cells at the very first field so that at least one difficult field could be made from this and every of the next $N - 1$ number of cells.

Input

The line of the input consists an integer N ($1 \leq N \leq 10000$).

Output

Output an integer – the number of cells at the first of N consequent difficult fields. This number is not required to be minimal, but it must not exceed 10^{4500}. If the numbers with necessary properties do not exist, output the number 0.

Examples

p.in	p.out
1	4
2	8
3	14
4	24
5	32

Problem Q. Breaking the table of records

Input file:	`q.in`
Output file:	`q.out`
Time limit:	1 second
Memory limit:	64 Mebibytes

Hacker Vasia is haunted with the fact that the first place in record table of Peter's game is taken by some Kolia. With the help of dodgy method he managed to achieve the number set by the machine code to be next to his name at the record table. However, due to the result to be plausible he decided to strike several digits of the number out, but the way the number obtained to be as big as possible.

Help Vasia to find out the maximum number which can be obtained after striking the digits out.

Input

The first line has two integer numbers N and k ($0 \le k < N \le 300000$), the number of digits in the source number and the number of digits, which has to be strikeout. The second line contains a source naturel number of N digits.

Output

Output to the only line the maximum number that Vasia can obtain.

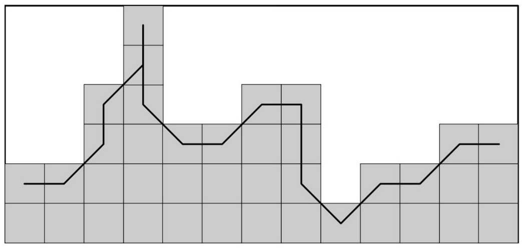
Examples

q.in	q.out
7 6 1234321	4
3 1 718	78
4 2 1224	24

Problem R. Chine

Input file:	`r.in`
Output file:	`r.out`
Time limit:	1 second
Memory limit:	64 Mebibytes

During the battles in Peter's game the chine is shown in the background. The chine represents a connected and convex in the vertical direction set of pixels, the bottom side of which is parallel to the horizontal line.



Vasia said that this chine is generated with random numbers sensor which was used during the battle too, so Kolia is sure that after studying the mountains attentively he will be able to divine course of the battle. Particularly he is interested with the length of the chine left to right (the number of pixels on the bottom side) and with the maximum elevation (vertical distance between the very top and the very bottom pixels).

Input

The chine is defined by the upper envelope of the polygon, every link of which connects neighbor pixels horizontally, vertically or diagonally. The first line contains an integer N ($1 \leq N \leq 100000$), the number of links of the polygon. The each of the following N lines contains a pair of numbers x and y – coordinates of the vector, which defines the corresponding link of the polygon ($0 \leq x \leq 1$, $-1 \leq y \leq 1$, $x^2 + y^2 \neq 0$).

Output

Output to the only line two integers – the length of the chine and the maximum elevation.

Example

r.in	r.out
18 1 0 1 1 0 1 1 1 0 1 0 -1 0 -1 1 -1 1 0 1 1 1 0 0 -1 0 -1 1 -1 1 1 1 0 1 1 1 0	13 5

Problem S. Building of the storage

Input file:	`s.in`
Output file:	`s.out`
Time limit:	1 second
Memory limit:	64 Mebibytes

On one of the maps sized $M \times N$ a player gets a hero, which can in one of the cells of the map build a storage, where he will accumulate various things that are scattered on the map. During one step hero can:

- move to one of the horizontally, vertically or diagonally neighbor cells;
- take a thing, if there is at least one thing in the cell, where he is situated, and he had nothing in his inventory (the things are so heavy that hero can carry not more than one thing);
- convey the thing from the inventory to the storage, if the hero is in the cell, where a storage has been built.

Kolia wants to know where on the map he should build the storage so that after it has been built to need the minimum number of steps to searching and storing all the things that exist on the map.

Input

There are integers M and N in the first line, describing the sizes of the maps ($1 \le M, N \le 1000$). In the following M lines N integers, defining the numbers of things in the corresponding cells of the map, are written in each. All these numbers are not negative and do not exceed 1000.

Output

The first line contains the coordinates (number of the line and the column) of the cell, where the storage should be situated, the second line contains the number of steps, which is necessary then to take all things. Take into account that if a thing is in the same cell where the storage is, all the same it has to be taken and shift to the storage.

Examples

s.in	s.out
4 4 0 0 1 0 0 1 0 1 0 0 1 0 0 0 0 0	2 3 16
4 3 0 0 2 0 1 1 0 1 0 2 0 0	2 2 38

Problem T. Heroes power

Input file:	`t.in`
Output file:	`t.out`
Time limit:	1 second
Memory limit:	64 Mebibytes

In the game written by Peter every hero has 4 battle figures: attack power, power protection, the power of magic and the power of knowledge. At first he has some figures generated accidentally. However, while storing the experience and transiting hero to a new level of knowledge, a possibility to increase on of these powers by 1 is given to a player.

Peter thinks that the efficiency of a hero is defined by the sum of squares of his figures. At the same time Vasia thinks that efficiency is defined by the multiplication of these numbers.

Kolia is confused and asks you to help him to find out what maximum efficiency by Peter's and Vasia's formulas hero can get after increasing the level by some number.

Input

The first line contains four numbers A, D, M, K – source battle figures of Kolia's hero. The second line – the number of increases of the level. All numbers are not negative and do not exceed 10000.

Output

Output two integers – maximum efficiency, which hero can achieve by Peter's formula, and maximum efficiency by Vasia's formula.

Examples

t.in	t.out
2 2 2 2 0	16 16
2 3 2 3 1	33 54
1 2 3 6 3	95 162

Problem U. Caravan

Input file:	`u.in`
Output file:	`u.out`
Time limit:	1 second
Memory limit:	64 Mebibytes

> "Hello. My name is Cyril. I want you to make a game, 3D-action, the idea is in the following... A user can play wood elves, palace guard and the thief. And if the the user plays elves, elves are in the forest, the houses are wood, palace army and thiefs run against. One can rob corovans... [skipped] P.S. I'm waiting two years for such game."
>
> *A letter to game-developing company MiST land*

And of course while developing Peter had to take into account the wishes of world computer society, that's why one can "run against" and "rob corovans" in his game. Caravan consists of wagons, each of them has a certain amount of gold. The robbery can be started from any wagon, moving further to the next or the previous one and taking gold situated in them. The operation must be made quickly enough or guard will come and grab the robbers. Thus the gold can be taken not from the all wagons.

Kolia is playing elves as expected, he knows the number of wagons in the caravan N, and how much gold is in every wagon (there is a_i of gold in the i wagon), and maximum number of wagons k, which his squad will be able to visit before the guard comes. He needs to know the maximum amount of gold, which he can get in the end of the operation.

Input

The first line contains two integers N and k ($1 \le k \le N \le 100000$), defining the size of the caravan and maximum number of wagons, which can be robbed. The second line contains N integers a_i, defining the amount of gold in wagons ($0 \le a_i \le 10000$).

Output

In the only line output the maximum sum, which can be obtained by robbery.

Example

u.in	u.out
7 3 3 2 1 2 3 2 1	7