Problem A. Rook

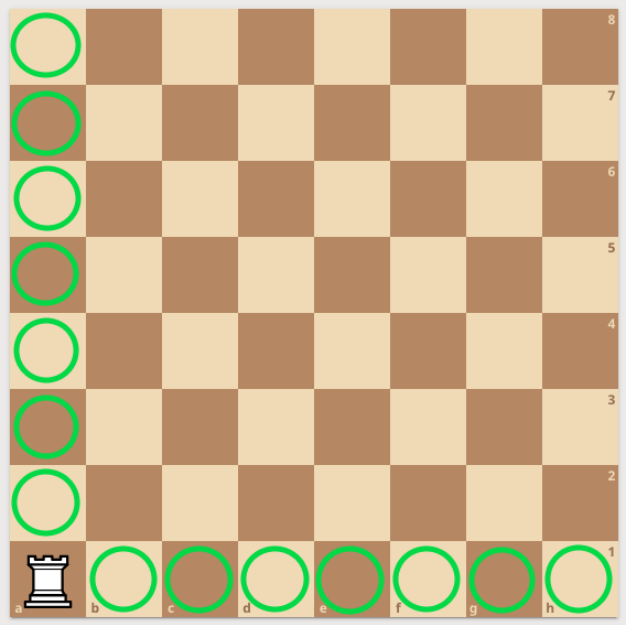
Input file:	`standard input`
Output file:	`standard output`
Time limit:	1 second
Memory limit:	256 megabytes

Given a chessboard of size $n \times m$, i.e., with n rows and m columns.

There is only one piece on this chessboard — a rook. It is located in the bottom left corner. There are no other pieces.

Recall that a rook can move any number of cells horizontally or vertically in one move, but not diagonally.

Find the number of cells the rook can move to in one move.



The image shows a traditional chessboard of size 8×8. On this board, the rook can move to all the cells marked in green. There are a total of 14 such cells, so the answer is 14.

Input

The first line contains a single integer n ($1 \le n \le 20$).

The second line contains a single integer m ($1 \le m \le 20$).

Output

Output the number of cells the rook can move to in one move.

Examples

standard input	standard output
8 8	14
3 2	3

Note

An explanation of why the answer to the first example is 14 can be seen in the image above.

In the second example, the answer is 3, because the rook can only move one position up and two positions to the right.

Problem B. Coordinates

Input file:	`standard input`
Output file:	`standard output`
Time limit:	1 second
Memory limit:	256 megabytes

Given a point (x, y, z) in 3D space. Find the square of the distance from this point to the origin (i.e., to the point $(0, 0, 0)$).

Input

The first line contains one integer x ($-100 \le x \le 100$).

The second line contains one integer y ($-100 \le y \le 100$).

The third line contains one integer z ($-100 \le z \le 100$).

Output

Output one integer.

Example

standard input	standard output
1 -3 5	35

Problem C. Sleepy Sasha is Trouble at the University

Input file:	`standard input`
Output file:	`standard output`
Time limit:	1 second
Memory limit:	256 megabytes

Once upon a time, Sasha fell asleep so deeply that he was able to rewrite the laws of physics, and now in his reality, a day lasts 30 hours.

And today he decided not to rewrite the laws, but to go to classes. He has been assigned x classes, each lasting 90 minutes. In addition to classes, Sasha, like any decent student, has some unfinished homework, so today he decided to complete all the assignments.

There are a total of n unfinished homework assignments, and it will take Sasha a_i minutes to complete each of them.

Inform poor Sasha how many hours and minutes he will sleep today, if he needs to attend all the classes and complete all the homework. Note that he cannot do more than one task at a time. Also, he cannot do his homework while on classes.

Input

The first line contains two integers n and x ($1 \le n, x \le 100$) — the number of homework assignments and classes for Sasha.

The second line contains n integers $a_1, a_2, \ldots, a_n$ ($1 \le a_i \le 100$) — the time it takes Sasha to complete homework assignment number i.

Output

Output -1 if Sasha not only will not sleep, but also will not have time to complete all the unfinished homework.

Otherwise, output two integers: the number of hours and the number of minutes Sasha will sleep.

Scoring

In this problem, there are conditional blocks. If your solution works correctly for certain constraints, it will receive a certain number of points. Note that each test is graded individually.

1. (10 points): $n = 1$;
2. (10 points): $x = 1$;
3. (20 points): $a_1 = a_2 = \cdots = a_n$;
4. (60 points): without additional constraints.

Examples

standard input	standard output
2 2 1 2	26 57
3 3 60 60 60	22 30
1 19 29	1 1

Note

In the first test, Sasha has 2 classes, which will take a total of $90 + 90 = 180$ minutes, after which he will spend another $1 + 2 = 3$ minutes on homework, so he will have exactly 26 hours and 57 minutes left out of 30 hours.

In the second test, Sasha has 3 classes, which will take a total of 270 minutes, and he will spend another $60 + 60 + 60 = 180$ minutes on homework, so he will have only 22 hours and 30 minutes left for sleep.

Problem D. Bohdan against "tails"

Input file:	`standard input`
Output file:	`standard output`
Time limit:	1 second
Memory limit:	256 megabytes

Having seen Sasha's skill in solving "tails Bohdanchik also decided to settle all his debts in mathematics.

In total, he has n tasks, each of which has a specific topic denoted by the number a_i.

Because some topics are repeated, Bohdanchik solves them faster, namely:

- If Bohdanchik solves a task of a certain topic for the first time, he uses x minutes of time.
- If he solves it not for the first time and the last time he solved this topic he spent q minutes, then this time he will spend $\max(\lfloor \frac{q}{2} \rfloor, 1)$ minutes.

Find the total time in minutes that he will spend solving the homework.

In the notation, $\lfloor X \rfloor$ means rounding down (to the nearest integer), for example, $\lfloor 3.14 \rfloor = 3$, $\lfloor 3.9 \rfloor = 3$.

Input

The first line contains two integers n and x ($1 \le n \le 10^5$, $1 \le x \le 10^9$) — the number of math tasks and how long Bohdanchik solves the homework of a certain topic for the first time.

The second line contains n numbers $a_1, a_2, \ldots, a_n$ ($1 \le a_i \le 10^9$) — the topic of the i-th task.

Output

Output a single number — the number of minutes needed for Bohdanchik to solve all the tasks.

Scoring

In this problem, there are conditional blocks. If your solution works correctly for certain constraints, it will receive a certain number of points. Note that each test is graded individually.

1. (5 points): $x = 1$;
2. (15 points): $n \le 1000$;
3. (15 points): $a_i \le n$;
4. (15 points): $a_1 = a_2 = \cdots = a_n$;
5. (50 points): without additional constraints.

Examples

standard input	standard output
2 2 1 2	4
3 4 2 2 2	7

Note

In the first test, he will complete the task with topic 1 in 2 minutes, and the task with topic 2 in 2 minutes, spending a total of 4 minutes.

In the second test, when solving the task with topic 2 for the first time, he will spend 4 minutes, when solving it again, he will spend $\max(\lfloor \frac{4}{2} \rfloor, 1) = 2$ minutes, and when solving the task with topic 2 for the third time, he will spend $\max(\lfloor \frac{2}{2} \rfloor, 1) = 1$ minute, so in total he will spend $4 + 2 + 1 = 7$ minutes.

Problem E. Pasha is also against "tails"?

Input file:	`standard input`
Output file:	`standard output`
Time limit:	1 second
Memory limit:	256 megabytes

Pasha will perfectly manage to study exactly **one** topic in mathematics before the exam, but there are many tasks on the exam and from different topics, so what to do?

Pasha has learned to change the topics of exam tasks. So he won't fail.

If the topic of the task is a_i, then in one operation Pasha can change the topic of the task in one of the following ways:

- $a_i := a_i + 1$;
- $a_i := a_i - 1$.

In other words, in one operation Pasha can choose some element of the array and change it by one.

Pasha was lucky to find exam tickets in the e-learning system, there are a total of n questions, each of which is characterized by a single number a_i. However, things are not so smooth, so to minimize the chance of getting caught, he must make the **minimum** possible number of operations.

Your task is to transform all tasks into tasks of one topic with the **minimum** number of operations.

Input

The first line contains a single integer n ($1 \le n \le 2 \cdot 10^5$) — the number of tasks.

The second line contains n integers $a_1, \ldots, a_n$ ($1 \le a_i \le 10^9$) — the topics of the tasks.

Output

Output a single number — the minimum number of operations.

Scoring

In this problem, there are conditional blocks. If your solution works correctly for certain constraints, it will receive a certain number of points. Note that each test is graded individually.

1. (20 points): $a_i \le 100$, $n \le 100$;
2. (40 points): $n \le 1000$;
3. (40 points): without additional constraints.

Example

standard input	standard output
5 2 3 5 1 2	5

Note

In the first test, the optimal solution will be to perform the following operations:

1. apply the operation to the 2nd task: assign $a_2 := a_2 - 1$ after this the array will become equal to $[2, 2, 5, 1, 2]$;

2. apply the operation to the 3rd task: assign $a_3 := a_3 - 1$ after this the array will become equal to $[2, 2, 4, 1, 2]$;
3. apply the operation to the 3rd task: assign $a_3 := a_3 - 1$ after this the array will become equal to $[2, 2, 3, 1, 2]$;
4. apply the operation to the 3rd task: assign $a_3 := a_3 - 1$ after this the array will become equal to $[2, 2, 2, 1, 2]$;
5. apply the operation to the 4th task: assign $a_4 := a_4 + 1$ after this the array will become equal to $[2, 2, 2, 2, 2]$;

It can be shown that obtaining an answer less than 5 is not possible.

Problem F. Anton buys a piglet

Input file:	`standard input`
Output file:	`standard output`
Time limit:	1 second
Memory limit:	256 megabytes

Anton decided not to save money, but to buy a piglet. To help with the money, he turned to his acquaintance, the wizard Kozak Vusa. It so happened that Kozak Vusa was too busy preparing special smoothies of the "B"brand, so he simply decided to give Anton two magic buttons:

1. pressing the first button doubles his balance;
2. pressing the second button adds exactly 2^k coins to his balance.

At the underground piglet auction, Anton saw that the cheapest beautiful piglet costs x karbovanets.

He was about to start pressing the buttons, but remembered that for such manipulations, the employees of "Polybank"could sue him. Therefore, he decided that he would try to get **exactly** x coins, after which he would immediately buy the piglet and again have exactly 0 karbovanets in his account.

Now you need to help Anton with a plan of action, and if possible, determine the minimum number of operations needed and output the order of operations. For this, Anton promised to let you play "Calculator Online"on his laptop.

Input

The first line contains two integers k and x ($0 \le k \le 10^5$, $1 \le x \le 10^{18}$).

Output

In the first line, output a single number n ($1 \le n \le 1\,000$) — the minimum number of operations of pressing one of the buttons needed to reach the balance x.

In the second line, output n integers $a_1, a_2, \ldots, a_n$ ($1 \le a_i \le 2$) — the buttons in the order they need to be pressed.

If it is impossible to obtain a balance exactly equal to x using the given buttons, output -1.

Scoring

In this problem, there are conditional blocks. If your solution works correctly for certain constraints, it will receive a certain number of points. Note that each test is graded individually.

1. (33 points): $x \le 10^6$;
2. (33 points): $x \le 10^9$;
3. (34 points): without additional constraints.

Examples

standard input	standard output
3 24	3 2 2 2
1 3	-1
0 13	6 2 2 2 1 1 2

Note

In the first test, we can press the second button 3 times, then the balance will be equal to $2^3+2^3+2^3 = 24$.

In the second test, it can be shown that it is impossible to obtain a balance equal to 3 using the given buttons.

In the third test, the following operations can be performed:

1. pressing the 2 button, the balance is equal to 1;
2. pressing the 2 button, the balance is equal to 2;
3. pressing the 2 button, the balance is equal to 3;
4. pressing the 1 button, the balance is equal to 6;
5. pressing the 1 button, the balance is equal to 12;
6. pressing the 2 button, the balance is equal to 13.

It can be shown that these answers are minimal for each test.