Problem A. Distance

Input file:	`Standard input`
Output file:	`Standard output`
Time limit:	2 seconds
Memory limit:	256 mebibytes

Artem likes his car. He likes to drive lately at night around the area. But Artem's car is very old, so it can go at most two miles at a time.

Artem lives in the area that has n cities and $(n-1)$ bidirectional roads. All cities are connected, that is, one can reach any city from any other city. The length of each road is one mile.

Artem wants to find the number of different pairs of cities such that the length of the shortest path between them is exactly two miles. Two pairs of cities are considered different if there exists a city which belongs to exactly one of these pairs.

Input

The first line of input contains a single integer n ($1 \le n \le 10^5$), the number of cities. The next $(n-1)$ lines contain descriptions of the roads. Each of these lines contains two integers v_i and u_i ($1 \le v_i, u_i \le n$) which mean that city v_i is connected by a bidirectional road with city u_i.

It is guaranteed that one can reach any city from any other city using the road network.

Output

Output a single integer: the answer to the problem.

Examples

Standard input	Standard output
3 1 2 2 3	1
4 1 2 2 3 1 4	2

Problem B. Science

Input file:	`Standard input`
Output file:	`Standard output`
Time limit:	2 seconds
Memory limit:	256 mebibytes

Little Artem became a scientist. More specifically, he became a chemist. He is studying crystal lattices. Artem is interested in the connections in them.

In this problem, you can imagine a crystal lattice as a string of length n that consists of two types of atoms. Artem is interested only in atoms of the first type. A k-*stable connection* is a substring that consists of k consecutive atoms of the first type which are surrounded with atoms of the second type.

Artem wants to calculate the expected number of k-stable connections in a randomly generated string of length n. In a randomly generated string, every atom is of either the first or the second type with equal probability, independently from other atoms.

Input

The first line of input contains two integers n and k ($1 \le n \le 10^{18}$, $1 \le k \le 100$) which are the length of the random string and the desired length of stable connections.

Output

Output a single real number: the required expectation. The answer is considered correct if the absolute or relative error is no more than 10^{-9}.

Examples

Standard input	Standard output
`3 1`	`0.12500000000000000000`
`5 2`	`0.12500000000000000000`
`5 1`	`0.37500000000000000000`

Problem C. Intervals

Input file:	`Standard input`
Output file:	`Standard output`
Time limit:	5 seconds
Memory limit:	256 mebibytes

Little Artem wants to found a startup. He is sure it will become successful. At this moment, Artem doesn't want to tell anybody his great ideas, but he needs some help.

Artem has many plans and tasks, but he doesn't have a lot of time. He wants you to help him with one of the tasks.

You are given an array of integers. You need to find the number of different pairs (l, r) $(l < r)$ such that the difference between some two elements from different positions among $a_l, a_{l+1}, \ldots, a_r$ equals to d. More formally, there must exist such i and j that $l \le i, j \le r$, $i \ne j$ and $a_i - a_j = d$.

Input

The first line of input contains two integers n and d ($1 \le n \le 3 \cdot 10^5$, $-10^9 \le d \le 10^9$). The next line contains n integers $a_1, a_2, \ldots, a_n$ separated by spaces ($-10^9 \le a_i \le 10^9$).

Output

Output a single integer: the number of different pairs (l, r) with the required property.

Examples

Standard input	Standard output

Problem D. Evil Palindromes

Input file:	`Standard input`
Output file:	`Standard output`
Time limit:	6 seconds
Memory limit:	256 mebibytes

Little Artem likes palindromes and his car very much. He likes his car so much that he has bought a digital locker for the door to protect it. To open the locker, one needs to input an integer code. Since Artem likes palindromes, he's obviously chosen one of them as the code for the locker. But he always forgets the right number.

A number is a palindrome if its decimal notation without unnecessary leading zeroes reads the same from left to right and from right to left. Note that a negative number is not a palindrome.

On one of the days when Artem has forgotten the code again, and so went for the bus stop instead of driving his car, he decided to create a hint for himself. Of course, he doesn't want the hint to be very easy. He decided to write such a number n on the locker that his code is the k-th next palindrome for this number n. Then, Artem has to remember only the number k.

Let us formally define the k-th next palindrome for an integer n given that $k \neq 0$. If $k > 0$, write down all palindrome numbers which are strictly greater than n in ascending order; the answer is k-th of these numbers. If $k < 0$, write down all palindrome numbers which are strictly less than n in descending order; the answer is $|k|$-th of these numbers.

Given the numbers n and k, help Artem to find the code.

Input

The first line of input contains two integers n and k ($-10^{100\,000} < n < 10^{100\,000}$, $-10^9 \le k \le 10^9$, $k \neq 0$) which are the hint and the number remembered by Artem. The given numbers don't contain unnecessary leading zeroes.

Output

Find the k-th next palindrome for the number n. If it does not exist, print "`-1`".

Examples

Standard input	Standard output
`15 1`	`22`
`0 1`	`1`
`-1 -1`	`-1`
`22 -1`	`11`

Problem E. Tetrahedron

Input file:	`Standard input`
Output file:	`Standard output`
Time limit:	1 second
Memory limit:	256 mebibytes

Artem found a tetrahedron. He put it on a horizontal desk, the surface of which coincides with the plane $z = 0$, so that the coordinates of all vertices of the tetrahedron happened to be integers. After that, Artem released the tetrahedron, leaving it to the force of gravity directed downwards.

Artem wonders whether the tetrahedron is standing stable, is in an unstable position, or will fall. It is known that the tetrahedron is homogenous, that is, the mass of any part of it is proportional to the volume of that part. Help him to answer this question.

Input

The input consists of four lines; i-th of these lines contains three integers x_i, y_i and z_i which are the coordinates of i-th vertex of the tetrahedron.

The coordinates are such that $-1000 \le x_i, y_i, z_i \le 1000$, $z_1 = z_2 = z_3 = 0$ and $z_4 > 0$.

It is guaranteed that the tetrahedron has non-zero volume.

Output

If the tetrahedron will stay stable on the desk, print "`Standing`", if it is in an unstable position, print "`Unstable`", and if it will fall, print "`Falling`".

Examples

Standard input	Standard output
1 1 0 3 1 0 1 3 0 2 2 2	Standing
0 0 0 2 0 0 0 2 0 -2 -2 1	Unstable
1 1 0 3 1 0 1 3 0 10 2 2	Falling

Problem F. Weird Game

Input file:	`Standard input`
Output file:	`Standard output`
Time limit:	6 seconds
Memory limit:	256 mebibytes

Attention! The source size limit for this problem is 20 480 *bytes.*

Artem likes games. He always plays different games with his friends and always wins. What helps Artem to win? He is smart, and he creates these games himself.

Now he is working on a new game. In this game, two players are given an $1 \times n$ board that is initially colored white. Players take turns alternatively. On each turn, a player can paint a segment of consecutive white cells of length L with black color. If a player cannot make his turn, he loses the game.

Now you need to help Artem do an analysis of the game. He wants to figure out who will win the game for each value of L from 1 to n, inclusive. You can assume that both players play optimally.

Input

You are given a single integer n ($1 \leq n \leq 7000$).

Output

Print a single line containing n characters. The i-th character must be equal to "`F`" if the first player wins when $L = i$. Otherwise, the i-th character must be equal to "`S`".

Examples

Standard input	Standard output
`3`	`FFF`
`8`	`SFSFFFFF`